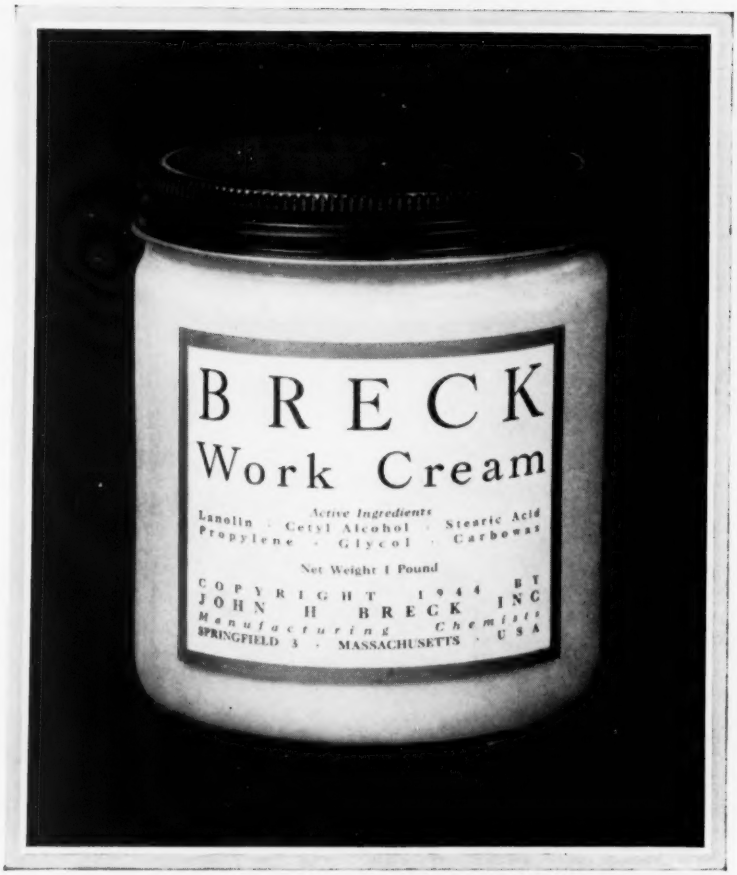
INDUSTRIAL MEDICINE AND SURGERY

Volume 25 JULY 1956 Number 7



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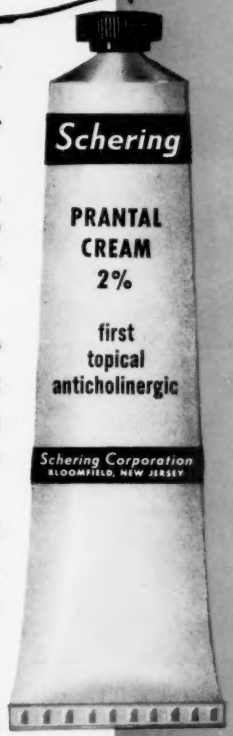

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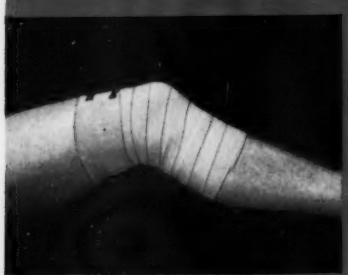

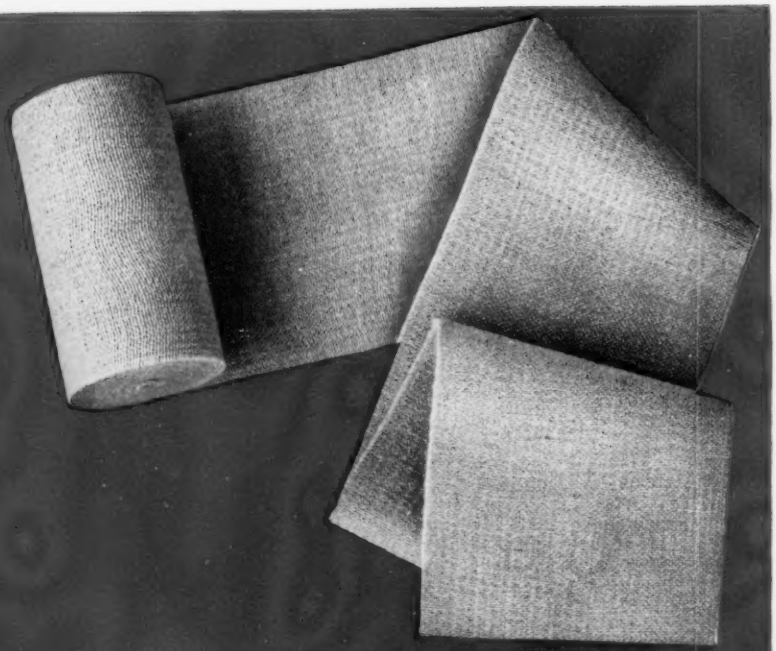

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INDUSTRIAL MEDICINE AND SURGERY, The Journal of Medicine in Industry (with which are consolidated "The Industrial Doctor" and "International Journal of Medicine and Surgery"): Entered as second class mail matter August 28, 1941, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879. Reentered, October 3, 1949. Additional entry at Sheboygan, Wisconsin. Published on the fifth of each month by INDUSTRIAL MEDICINE PUBLISHING COMPANY, Chicago. STEPHEN F. HALOS, President; A. D. CLOUD, Publisher; CAREY P. MCCORD, M.D., Editor; DORIS FLOURNOY, Editorial Assistant; HAROLD A. HOOPER, Treasurer, STEPHEN G. HALOS, Chairman. Member, Audit Bureau of Circulations. PUBLICATION, EDITORIAL and EXECUTIVE OFFICES, 605 North Michigan Avenue, Chicago 11, Illinois. Miami Office, 5301 S. W. 76th Street, Miami, Florida. Subscription $6.00 per year in the United States; $8.00 (U.S. Currency) per year in Canada; $12.00 (U.S. Currency) per year in other countries. Single copies 75 cents. Title Registered in United States Patent Office. Registered Canada, 1942.

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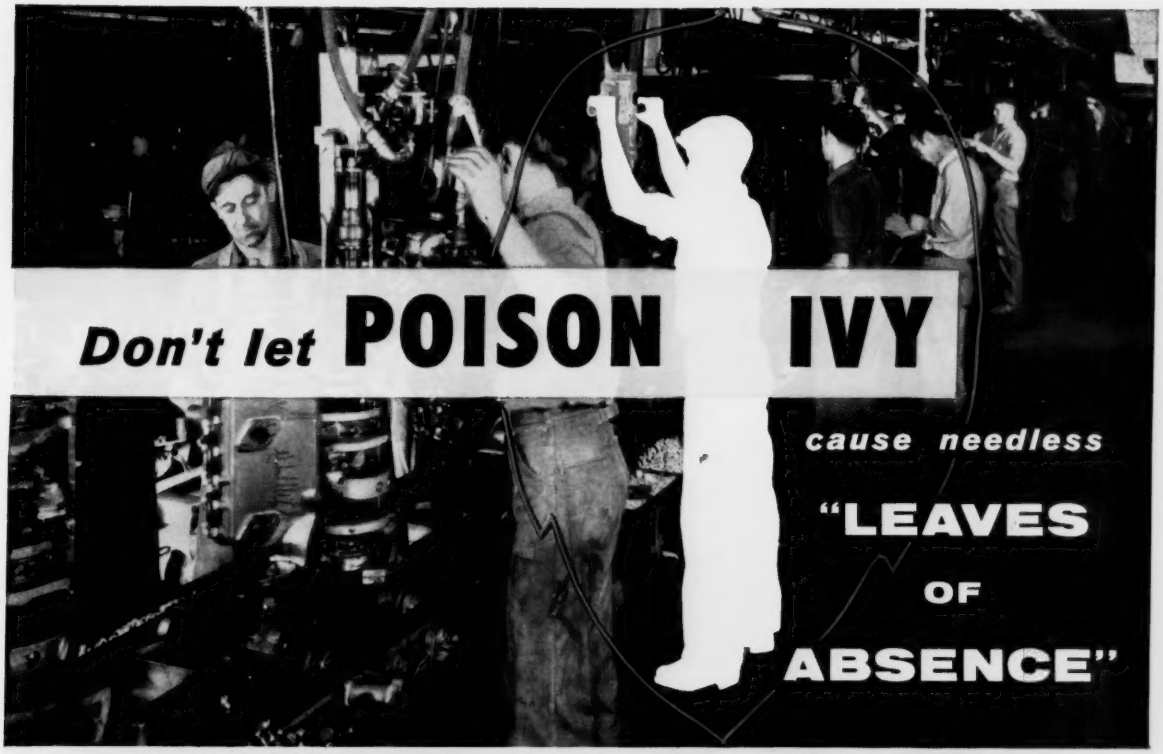

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JOHN A. PALESE, M.D., has been appointed Midwest Medical Director, Loss Prevention Medical Services, Liberty Mutual Insurance Company, with headquarters at Chicago, effective April 23, 1956. DR. PALESE received his B.S. at the University of Wisconsin in 1946 and his M.D. at University of Wisconsin Medical School in 1948; interned at West Suburban Hospital, Oak Park, Illinois, 1948-49; was in residence at Evangelical Deaconess Hospital, Milwaukee, 1951-53. From June, 1953, to September, 1954, he attended the University of Rochester; he received the degree of Master of Industrial Medicine in 1955. He then established a general practice in South Milwaukee, where he continued until the time of his present appointment. His tour of duty in the Army was completed in October, 1951; his areas of service included the Panama Canal Zone and Korea. He is a member of the State of Wisconsin and Milwaukee County Medical Societies, American Medical Association, American Academy of General Practice, and the Industrial Medical Association.

GILBERT B. MEYERS, M.D., on April 16, 1956, joined the medical staff of Radio Corporation of America as Plant Physician at Camden, New Jersey. Dr. Meyers was born in January, 1922, at Pittsburgh; received his M.D. at Pittsburgh Medical School in 1947; interned at Pittsburgh Hospital and Mercy Hospital, 1946-48; spent a year in Indoctrination and On-the-Job Training in Industrial Medicine, New York Naval Shipyard, 1950-51; attended the University of Pennsylvania Medical School's

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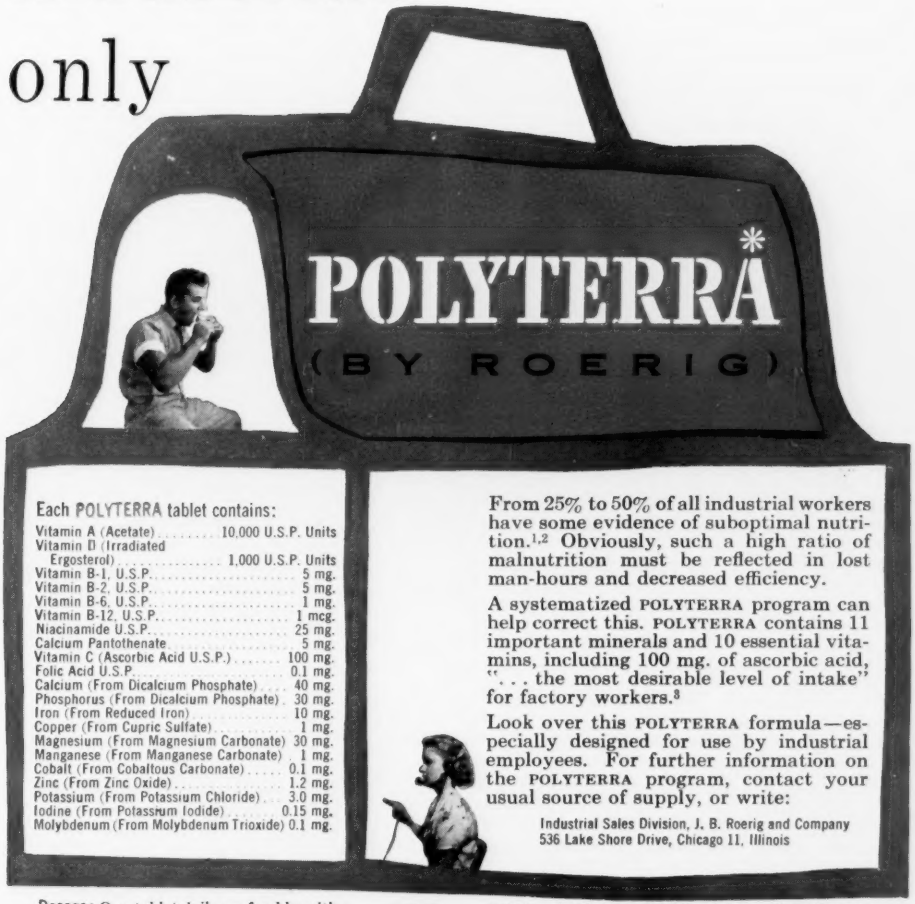

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1. Babcock, M. J., et al: Milbank Mem. Fund Quart.: 32:323 (Oct.) 1954. 2. McLester, J. S. and Darby, W. J.: Nutrition and diet in health and disease. W. B. Saunders and Company, Philadelphia, 1952, p. 584. 3. Pollack, H. and Halpern, S. L.: Therapeutic Nutrition, National Research Council, publication 234, 1952, p. 37.

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A MEMORIAL plaque honoring the late DR. CARL M. PETERSON for his lifetime devotion "to the increased health, welfare and employment opportunity of his fellowman" was presented to the American Medical Association, Monday, June 11, by DR. ROSS I. MCINTIRE on behalf of President Eisenhower's Committee on Employment of the Physically Handicapped. DR. MCINTIRE is the former Chairman of the President's Committee and retired Surgeon General of the Navy. DR. WILLIAM P. SHEPARD, of New York, Chairman of the Council on Industrial Health, accepted the plaque for the AMA. The plaque reads in part: "As Secretary, Council on Industrial Health, American Medical Association, DR. PETERSON was the pivot around which many of the great advances in industrial medicine centered in the past two decades. Our country and her handicapped men and women of today and tomorrow have much for which to thank this tireless man whose untimely death in the performance of duty saddened all those who knew him . . . ." DR. PETERSON, Secretary of the Council on Industrial Health for 17 years, and Chairman of the Medical Committee of the President's Committee, died last fall of injuries suffered in a plane crash in North Carolina.

JOHN W. BERRY, M.D., of St. Louis, has been appointed General Medical Adviser to the Southwestern Bell Telephone Company, with headquarters in St. Louis. He will investigate major problems of health that affect the telephone company's 59,000 employees. His activities will supplement those of Medical Advisers in Missouri, Texas, Arkansas,

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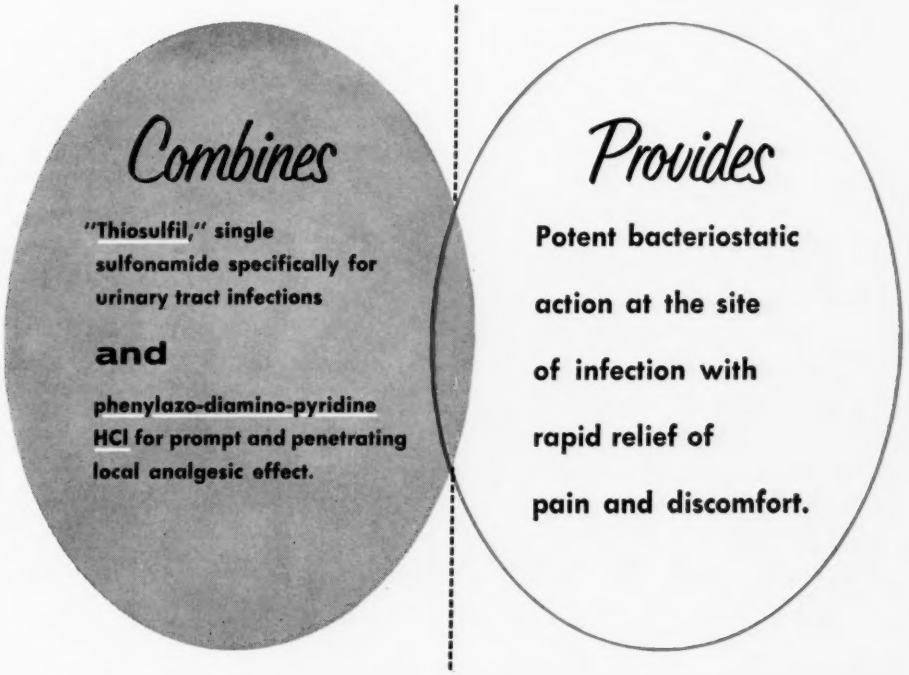
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Kansas, and Oklahoma. He will engage in activities devoted to preventive medicine, will organize a program of health-education and health motivation designed to encourage employees to safeguard their health, and will head research and clinical analyses of the more common illnesses. Much of his work will be with respiratory diseases, responsible for most illnesses that lead to lost work time. DR. BERRY was born in Toledo, Ohio; graduated at University of Toledo, 1943; received his M.D. at St. Louis University School of Medicine in 1946; and from 1949 to 1952 was Assistant Resident Physician at Barnes Hospital, St. Louis, and took postgraduate training at Washington University. Since December, 1954, he has been Medical Adviser to Southwestern Bell's Missouri-Illinois Area. He will continue as Associate Professor in Internal Medicine at St. Louis University, where he is the Chief of Medicine for the St. Louis University Service at City Hospital.

STANLEY E. GIARVE, M.D., former Coroner's Physician in Albany County, New York, has become associated with General Aniline Corporation in Rensselaer, New York. He was succeeded at the county post by BERNARD A. DUFFY, M.D. of Albany.

—*Troy, New York, Times Record,* April 19, 1956.

COLONEL B. DIXON HOLLAND brings to his new position as Secretary of the AMA Council on Industrial Health—which he assumes July 15—an extensive and varied experience in industrial medical work. Following internship, July, 1934, to June, 1935, he was on active duty as Army Medical Officer with Civil-

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ian Conservation Corps as camp "Health Officer and Doctor," July, 1935, to April, 1936. Then he became Health Officer, City of Olympia and County of Thurston, Washington State (first incumbent in newly established full-time postion) May, 1936, to December, 1936. He resigned to accept a commission in the Medical Corps of the Regular Army for which he had taken physical and professional examinations in the summer of 1936. He has been Medical Officer, Regular Army, since January, 1937, with major assignments and experiences as follows (the title "Surgeon" here means "the Health Officer"): Fort Stevens, Oregon, Assistant Post Surgeon, January, 1937, to June, 1937 (left to attend courses); Basic graduate courses at Army Medical Service Schools at Walter Reed Army Medical Center and Carlisle, Pennsylvania, September, 1937, to May, 1938; Fort Bragg, North Carolina, Preventive Medicine and Laboratory Officer, June, 1938, to June, 1940; Walter Reed Army Medical Center, three months' special course in clinical laboratory work at Army Medical Service Graduate School and Preventive Medicine Officer of the Center and Assistant Laboratory Officer of the hospital, July, 1940, to October, 1941; U.S. Army Task Force, Jamaica Surgeon, and hospital commander, November, 1941, to April, 1942; U.S. Army Antilles Department, Medical Battalion and hospital commander and Assistant Surgeon of the Antilles Department, May, 1942, to May, 1944; Command and General Staff School, Fort Leavenworth, Kansas, course in Army logistics and administration, June, 1944, to August, 1944; Army Service Forces Medical Training Center at Camp Barkeley, Texas and later Camp Crowder, Missouri, Director of Training, September, 1944, to July, 1945 (training was drastically curtailed after V-J Day); Office of Surgeon General of the Army, Washington, D.C., reviewing proceedings of boards on retirement of officers for physical disability, August, 1945, to August, 1946 (left to attend Public Health Course); School of Hygiene and Public Health, Johns Hopkins University, course leading to Master of Public Health degree, October, 1946, to May, 1947; Army Industrial Hygiene Laboratory (now Army Environmental Health Laboratory), Army Chemical Center, Maryland, as Assistant Commander, the late Colonel Wesley Cox being the Commander, June, 1947, to July, 1949; U.S. Army, Europe, Surgeon of Wurzburg Military Post, comprising about one-eighth of the U.S.-occupied zone of Germany, August, 1949, to August, 1950; of Munich Military Post, comprising about one-third of U.S.-occupied zone of Germany, and of Southern Area Command, comprising the Munich Military Post plus additional Posts, amounting to about three-fifths of U.S.-occupied zone of Germany, September, 1950, to July, 1953. In the Office of the Surgeon General, Department of the Army, he was Chief of the newly established Occupational Health Branch, in Preventive Medicine Division, in charge of overseeing and directing the Army Federal Civilian Employees' Health Service, to extend to civilian employees of the Army in U.S. and overseas, an industrial medical program, and to manufacturers operating government-owned plants on contract. Brought to bear and integrated in the Army Safety Program the contributions of the biological sciences. Developed new regulations and a new system and forms for record-keeping and reporting, then for their field trial was assigned to Aberdeen Proving Ground, a highly diversified industrial establishment of the Army, with over 6,000 civilian employees and an equal number of military personnel. Since July, 1955, he has been Medical Director, Army Federal Civilian Employees' Health Service, and Chief of Preventive Medicine and Assistant Surgeon, Aberdeen Proving Ground, Maryland.

in rheumatoid arthritis

ROUTINE
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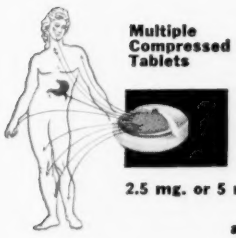
MEANS

'Co-Deltra'
(Buffered Prednisone)

'Co-Hydeltra'
(Buffered Prednisolone)



Multiple Compressed Tablets

Clinical evidence[1, 2, 3] indicates that to augment the therapeutic advantages of prednisone and prednisolone, antacids should be *routinely* co-administered to minimize gastric distress.

2.5 mg. or 5 mg. prednisone or prednisolone with 50 mg. magnesium trisilicate and 300 mg. aluminum hydroxide gel.

References: 1. Boland, E. W., *J.A.M.A.* **160**:613, February 25, 1956. 2. Margolis, H. M., *et al.* *J.A.M.A.* **158**:454, June 11, 1955. 3. Bollet, A. J., *et al.* *J.A.M.A.* **158**:459, June 11, 1955.

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ALL THE BENEFITS OF THE "PREDNI-STEROIDS" PLUS POSITIVE ANTACID ACTION TO MINIMIZE GASTRIC DISTRESS

Association of Ordnance Industry Physicians. Front row (left to right): M. J. Latimer, M.D., Iowa Ordnance Plant, Burlington; Frank D. Ryder, M.D., Cornhusker Ordnance Plant, Grand Island, Nebraska, President of the Association; Brig-General Joseph M. Colby, Commanding General, Frankford Arsenal; L. P. Devlin, M.D., Arsenal Medical Director, and Secretary-Treasurer of the Association; Colonel Irvine H. Marshal, Second Army, Ft. Meade, Maryland; John Foderaro, M.D., Arsenal Hospital Staff.

LEONARD J. GOLDWATER, M.D., Professor of Industrial Medicine at the Columbia University School of Public Health, at a meeting of the Staten Island Management Club in the Clove Park Restaurant, stressed the importance of the industrial medicine program in keeping valuable employees on the job and cutting down work stoppage due to wholesale illnesses. DR. GOLDWATER is a Consultant for the Atomic Energy Commission and the Work Classification Unit of the University's Cardiac Clinic. He explained the need of the program in small as well as large industries; and traced the history of industrial medicine until "it now can be considered as giving more than fringe benefits as far as industry and labor are concerned."

—*Staten Island, New York, Advance,* May 17, 1956.

ASSOCIATION OF ORDNANCE INDUSTRY PHYSICIANS—composed of Medical Officers assigned to or employed by Ordnance Plants—held an interesting and informative seminar at Frankford Arsenal, Philadelphia, April 27-28, 1956. The program included tours of the manufacturing divisions of the Arsenal's Small Arms, Artillery, and Fire Control Instrument Groups, and a varied scientific presentation of original papers on health problems encountered in Ordnance plants or new developments in the industrial medical field. Five scientific sessions covered various types of physical examinations, industrial dermatitis, surgical conditions, organization, staffing and functions of medical service programs, and special medical problems. The Association's business meeting was held at the John Bartram Hotel Friday evening, April 27. The Officers for the ensuing year are President, FRANK D. RYDER, M.D., Cornhusker Ordnance Plant, Grand Island, Nebraska; President-Elect, W. A. STOOPS, M.D., Badger Ordnance Works, Baraboo, Wisconsin; Secretary-Treasurer, LAURENCE P. DEVLIN, M.D., Frankford Arsenal, Philadelphia; Directors, A. L. KNIGHT, M.D., Ravenna Arsenal, Apco, Ohio; N. B. DANIEL, M.D., Lone Star Ordnance Plant, Texarkana, Texas; and GEORGE N. MANSION, M.D., Joliet Arsenal, Illinois. One director is to be appointed at the pleasure of the Chief of Ordnance who has a vested interest in the efforts of the Association to curtail absenteeism by practicing preventive medicine, thereby increasing the physical, mental and psychological health of employees. This leads to increased quality and quantity of production. One important objective for the next year is to secure the cooperation of local medical societies and individual practitioners in eliminating unnecessary use of sick leave.

O. A. SANDER, M.D., and ROGER S. MITCHELL, M.D., headed the faculty of a two-day postgraduate course in diseases of the chest, presented for physicians by the University of Texas Southwestern Medical School in association with the Dallas Tuberculosis Association. The course, given as the Third Annual Ivan H. Mattson Memorial Tuberculosis Seminar, was held on May 28 and 29, and offered 14 hours of formal credit to attending members of the Academy of General Practice. DR. SANDER is a member of the A.M.A. Council on Industrial Health, a Consultant on Occupational Diseases of the Lungs, and a noted authority on industrial granulomatosis, on which he has conducted a survey since 1932.

—*Dallas, Texas, Times-Herald,* May 20, 1956.

PRESTON N. BARTON, M.D., Lecturer, Occupational Medicine, Yale University School of Medicine, and Medical Director, New Departure Division, General Motors Corporation, Meriden, Connecticut, has an article in *Connecticut State Medical Journal,* April, 1956, entitled "Some Industrial Aspects of Back Pain." This was presented as part of a panel on low back pain at the 30th Connecticut Clinical Congress at New Haven.

W. DONALD ROSS, M.D., Associate Professor of Psychiatry and Assistant Professor of Industrial Medicine, University of Cincinnati, is the author of "Practical Psychiatry for Industrial Physi-

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the new injectable enzyme relieves inflammation through systemic action

Chymar reduces inflammation . . . restores circulation . . . hastens absorption of edema . . . stops further necrosis . . . promotes healing

4 hours after accident—
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72 hours later

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Inject 0.5 cc. of Chymar deep into the gluteal muscle 1 to 3 times daily for maximum benefit.

Immediately after surgery—
Chymar started

Inflammation of long-standing may require 0.5 cc. of Chymar once or twice a week for several weeks after the initial course.

4 days later

Chymar is a suspension of chymotrypsin, a proteolytic enzyme, in sesame oil for intramuscular injection. Each 1 cc. supplies 5000 units of proteolytic activity. 5 cc. vials.

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Western Industrial Medical Association. Standing (left to right): L. E. Curtis, M.D., Director; Verne G. Ghormley, M.D., Director; E. P. Luongo, M.D.; David D. Holaday, M.D., Vice-President; John E. Kirkpatrick, M.D.; A. C. Remington, M.D., Director; John S. Stephens, M.D., Director. Seated (left to right): Edward J. Zaik, M.D., Secretary; Packard Thurber, Jr., M.D., Chairman of the Board of Directors; Douglas D. McKinnon, M.D., President; Homer S. Elmquist, M.D.

cians," which is being published by Charles C. Thomas, Springfield, Illinois, and is scheduled for appearance in early October.

WESTERN INDUSTRIAL MEDICAL ASSOCIATION held its Fifteenth Annual Meeting at the Ambassador Hotel, Los Angeles, April 28, 1956. The morning session featured presentations as follows: "The Electromyogram in the Diagnosis of Infectious Polyneuritis," by A. A. MARINACCI, M.D., Instructor in Neurology, School of Medicine, University of Southern California, and Head of the Departments of Electroencephlography and Electromyography, Los Angeles County General and Good Samaritan Hospitals, and CARL W. RAND, M.D., Emeritus Professor, Department of Neurosurgery, School of Medicine, University of Southern California; "What the Industrial Physician Should Know About the Possible Hazards in the Use of Nuclear Reactors and Multi-Curie Sources in Industry," by MOSES A. GREENFIELD, Ph.D., Associate Professor of Radiology, Medical Center, University of California at Los Angeles; "Don't Blame Industry for Household Poisonings," by THOMAS J. HALEY, Ph.D., Associate Clinical Professor of Medicine (Industrial), Medical Center, and Chief, Division of Pharmacology and Toxicology, Atomic Energy Project, University of California at Los Angeles; and "Is There a Lack of Cooperation Between the Industrial Physician and the Industrial Nurse?" by MRS. LORNA WELLS, R.N., Northrup Aircraft, Hawthorne, and Western Industrial Nurses Association. During the afternoon W. P. SHEPARD, M.D., Second Vice-President, Health and Welfare, Metropolitan Life Insurance Company, spoke on "The Practice of Medicine in an Industrial Society"; STAFFORD L. WARREN, M.D., Dean, School of Medicine, University of California at Los Angeles and Director of the Atomic Energy Project, University of California at Los Angeles, on "What Is the Place of the Medical School in Occupational Medicine in Respect to Teaching Research and Service?"; and a preliminary report on a "New Method of Measuring Liver Damage and Kidney Damage by the Use of Radioisotopes" was given by GEORGE V. TAPLIN, M.D., Associate Clinical Professor of Medicine, School of Medicine, University of California at Los Angeles. The session closed with a Workmen's Compensation Clinic —at which RALPH E. MUSTOE, A.B., L.L.B., Presiding Commissioner for California Industrial Accident Commission, Los Angeles, A. D. CARSON, Liberty Mutual Insurance Company, Los Angeles, L. E. CURTIS, M.D., Chief, Medical Department, Standard Oil Company of California, San Francisco, and DAN O. KILROY, M.D., Sacramento, conducted a question and answer period on problems in workmen's compensation. The registration, totaling 250, included 102 physician members and guests, 85 industrial nurses, and 16 management representatives. PACKARD J. THURBER, JR., M.D., is President of the Association and Chairman of the Program Committee. Other officers include: DOUGLAS D. MCKINNON, M.D., Medical Director, *Times-Mirror* Company, Vice-President; EDWARD J. ZAIK, M.D., Medical Department, Pacific Telephone & Telegraph Company, Secretary; and CLARENCE LEE LLOYD, M.D., Medical Director, North American Aviation, Treasurer.

HAMILTON CAMERON, M.D., New York City, announces the recently incorporated International Research Council the first worldwide medical confraternity for the dissemination of knowledge concerning aphasias associated with hemiplegia. The aims of the Council include: the establishment of a clearing house on the subject, and the publication of a monthly *Review-Bulletin*. In January, 1943, DR. CAMERON became one of the 600,000 hemiplegia aphasics. He devised a "Hand Talking Chart" that has proved a practical clinical aid. This has been a boon to those vocally paralyzed who hitherto had no such

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means of communication with those around them. DR. CAMERON, for eight years has been supplying the Chart to physicians and nurses with no charge, through the cooperation of the Medical Editors and Editors of non-medical publications. For gratis copies of the Chart and the detail information of the nature and aims of the International Research Council, write DR. HAMILTON CAMERON, General Director, 601 West 110th Street, New York City 25.

ON FRIDAY, June 1, 1956, in the new Medical Science Building at Wayne University, Detroit, the Department of Industrial Medicine and Hygiene, under the direction of DR. ARTHUR J. VORWALD, for the first time threw open its doors for inspection of its facilities. The majority of industrial physicians and industrial hygienists in the Detroit area availed themselves of this opportunity to inspect what proved to be one of the most elaborate and well planned assemblages of instrumentation and personnel for research and service in the field of industrial toxicology. In a short time, it is hoped to present in these pages a full story of this outstanding development in the world of occupational health.

THE AUSTRIAN Society for Industrial Medicine will hold its "Third Austrian Congress on Industrial Medicine" in Vienna, October 1-4, 1956, under the title "Success by Early Diagnosis and Preventive Measures." Subjects will be: (1) medical examination for fitness and ensuing selection; examinations with regard to employment or re-employment; (2) the prevention of poisoning by proximate causes (technical expedients); (3) the prevention of illness (periodical examination and transfer to another post; medical prophylaxis); (4) the prevention of damages caused by prolonged work under conditions detrimental to health (violent motion, draft, etc.; prevention of accidents); (5) the economic value and advantages of preventive measures taken by industrial medicine. Sponsoring the Congress are the Federal Ministries of Education, Finance, Trade and Reconstruction, Social Administration, and Traffic and Nationalized Industries; the Medical Faculties of the Universities in Austria; several Branches of the Austrian Trade Union; the Social Insurance for Employees in Vienna; the Chamber of Commerce for Austria; and leading firms of trade and industry in Austria. Those interested to attend or to present a paper on the above subjects are asked to apply to the Organizing Secretary, DR. CH. FRIEBERGER, Austrian Society for Industrial Medicine, Vienna IX., Kinderspitalgasse 15, Austria.

THE PERMANENT International Committee on Industrial Medicine has announced a preliminary program for the Twelfth International Congress to be held in Helsinki, Finland, July 1-6, 1957. Congress subjects are to include: "Industrial Noise," "Evaluation of Invalidity," "Industrial Hygiene Norms," and "Cardiacs and Work." Section subjects will cover general and social aspects of industrial medicine, occupational pathology and hygiene, and industrial nursing. Reviews are to be presented on: "Psychosomatic Medicine Considered from the Aspect of Social Security," "Recent Advances in Industrial Ophthalmology," "Control of Chronic Diseases in Industry," and "Recent Advances in Silicosis Research." A round table discussion on "Team Work in Occupational Health" will be held. One afternoon will be reserved for group meetings at which it will be possible for university teachers, chairmen, secretaries and other officers of industrial physicians' associations, industrial nurses, medical inspectors of factories, industrial hygiene experts, social security representatives, safety engineers, persons interested in rehabilitation, medical officers and hygiene workers of the oil industry, medical officers in the textile, chemical, and metal industries, mine medical officers, and others, to get together. The Finnish hosts will give a luncheon at which a survey will be made of the topical questions of each sphere. The meeting will be followed by excursions in Helsinki. There will be an opportunity before and after the Congress for members to visit and acquaint themselves with the organization and operation of occupational medicine and hygiene in other Scandinavian countries. On July 7 an excursion to industrial establishments and hospitals in various parts of Finland will be featured. Further information may be had on application to the Organizing Committee, %Tyoterveyslaitos, Haartmaninkatu 1, Helsinki-Toolo. Chairman: DR. LEO NORO, and Secretary-General: DR. FERTTI SUMARI.

Deaths

WILLIAM G. SIMPSON, 59, President, Fawcett-Dearing Printing Company, Louisville, Kentucky, at Peter Bent Brigham Hospital, Boston. MR. SIMPSON was one of industrial management's most effective protagonists of industrial medicine. *Louisville Courier-Journal*, June 1, 1956, says of him: "Simpson once told a friend he had a secret ambition to be a doctor. That might explain the great interest he always had in Norton (Memorial Infirmary) and in medical facilities for his employees. An employee medical program he set up at Fawcett-Dearing in 1948 is considered one of the best in the nation. In 1951 it was cited by the Industrial Medical Association as the most outstanding in American industry. The program includes a full-time Medical Director, four full-time nurses, promotion of nutrition, a dental program, and periodic examination of employees. Simpson was 'always ready to put into practice any health or welfare program that would benefit employees,' said DR. GRADIE R. ROWNTREE, the plant's Medical Director. 'He was interested in employment of the handicapped and the welfare of all employees.'"

HOWARD L. SMALLMAN, M.D., 64, on April 1, 1956, at San Rafael, California. DR. SMALLMAN was born in Ellicottville, New York, in August, 1892; graduated M.D. from the University of Michigan Medical School, 1916; was Medical Director for Babcock & Wilcox Company, Barberton, Ohio, from 1923 to his retirement, October 1, 1954. He became a member of the Industrial Medical Association in 1942 and was made a Fellow, April 27, 1955.

FRANCIS P. FERRARO, M.D., 43, at Pittsburgh. Dr. Ferraro was Staff Surgeon at St. Francis Hospital; had been Surgeon for U.S. Steel Corporation since 1942, and for Alloy Manufacturing Company since 1946. From 1942 to 1954 he was also Surgeon for the Ford Motor Company. He was born in Sharpsburg, Pennsylvania; was a graduate of the University of Pittsburgh and its School of Medicine (M.D., 1937); at one time served as Team Physician for the School; was a member of AMA, American College of Surgeons, International College of Surgeons, and Industrial Medical Association.

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Supplied: White, 5 mg. oral tablets, bottles of 20 and 100. Pink, 1 mg. oral tablets, bottles of 100. Both deep-scored.

1. Johnston, T. G., and Cazort, A. G.: J. Allergy 27:90, 1956. 2. Schwartz, E.: New York J. Med. 56:570, 1956. 3. Schiller, I. W., et al.: J. Allergy 27:96, 1956.

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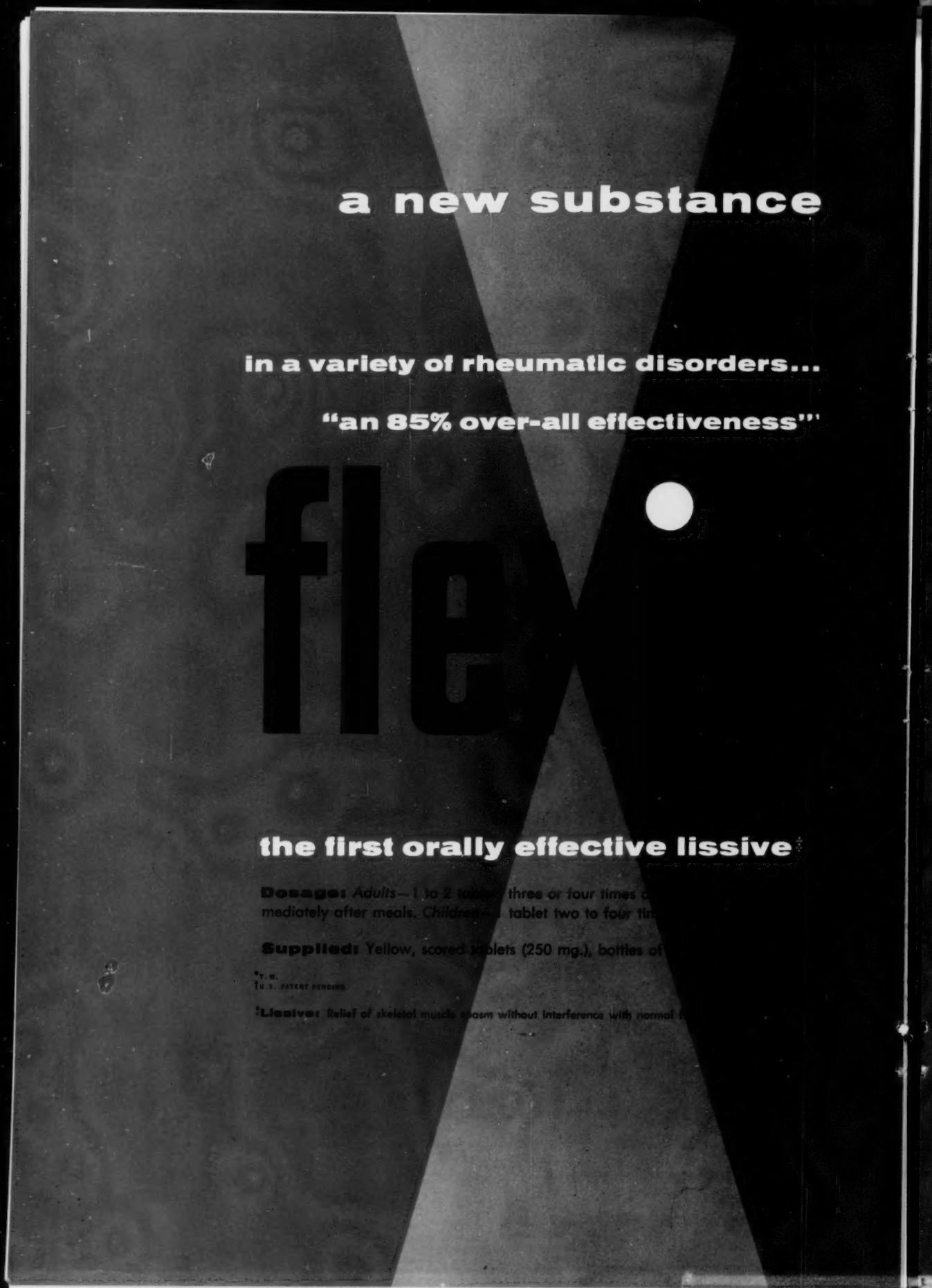
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in a variety of rheumatic disorders...
"an 85% over-all effectiveness"†
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Dosage: Adults—1 to 2 tablets three or four times a
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Supplied: Yellow, scored tablets (250 mg.), bottles of
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‡Lissive: Relief of skeletal muscle spasm without interference with normal

for true spasmolysis
of skeletal muscle

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magnified potency
with Meti-steroid
effectiveness in allergic
and inflammatory dermatoses

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Meti-Derm cream 0.5%

with METICORTELONE, original brand of prednisolone

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anti-inflammatory activity

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- *cosmetically acceptable*
- *water-washable*

for effective local relief of allergic (atopic and contact) dermatoses, nonspecific anogenital pruritus.

formula: Each gram of water-washable METI-DERM Cream contains 5 mg. (0.5%) of prednisolone, free alcohol, in a cosmetically acceptable base.

packaging: METI-DERM Cream, 0.5%, 10 Gm. tube.

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Meti-Derm ointment

with Neomycin

enhanced effectiveness

in allergic, inflammatory

dermatoses when

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neomycin in addition to prednisolone, free alcohol—for protective coverage against virtually all pathogenic skin bacteria with a well-tolerated, *topical* antibiotic.

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On your prescription be sure to write "Medihaler-Iso (or Medihaler-Epi) AND Medihaler Oral Adapter," since medication cannot be used without Adapter. For refills write for medication only.

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[*BRENNAN, J.W.: AM. J. OPHTH. 35:1343, 1952.]

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FURACIN ear solution—prompt antibacterial and deodorizing action in otitis.

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for inflammatory, allergic, infectious or traumatic eye conditions amenable to topical therapy—rapid, potent, topical Meti-steroid and anti-infective action

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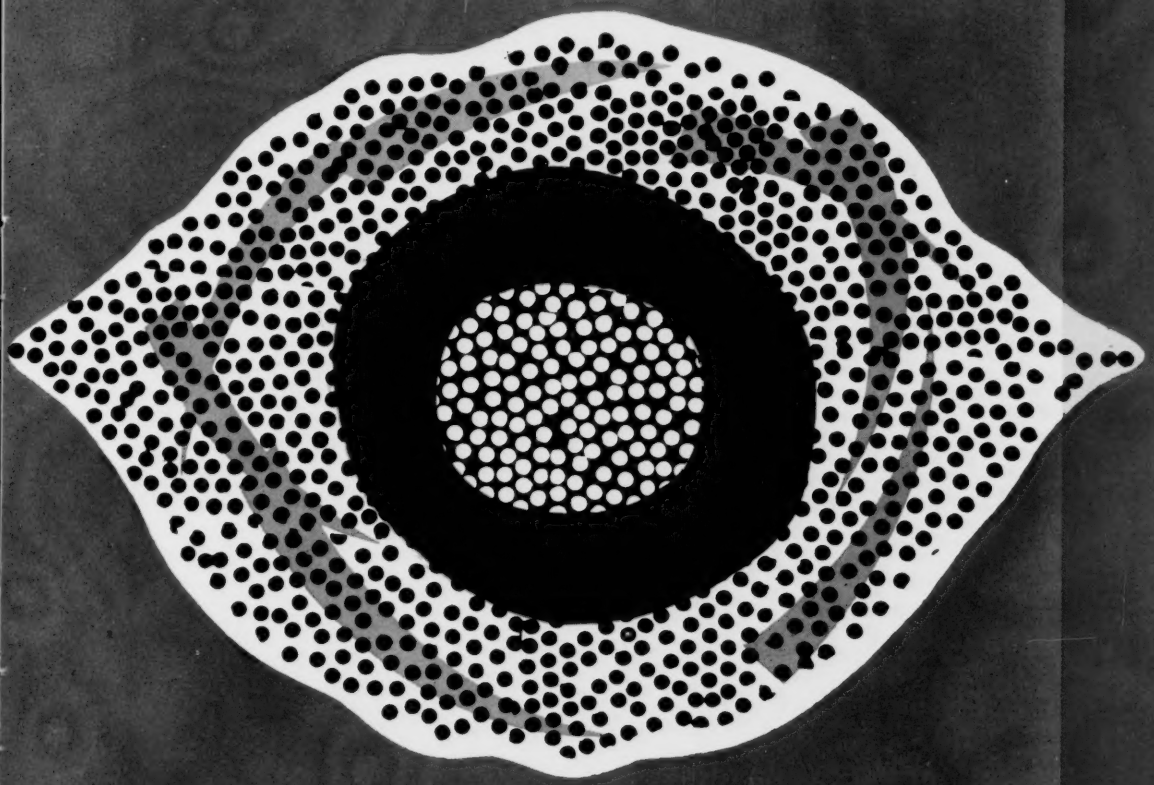

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Ointment with Neomycin

• antibacterial • antiallergic • anti-inflammatory

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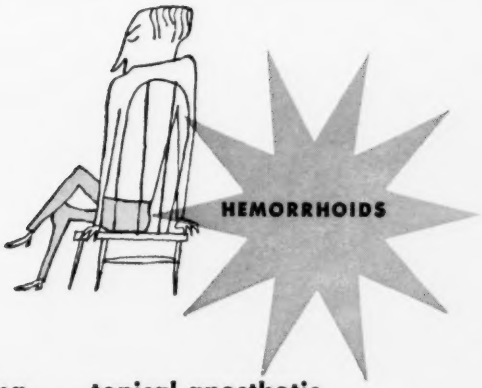

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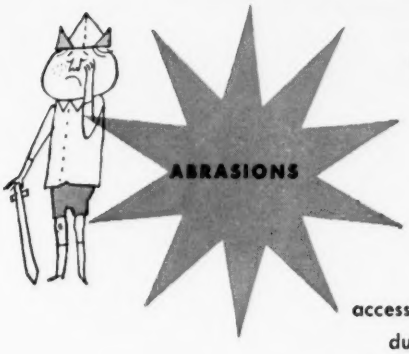

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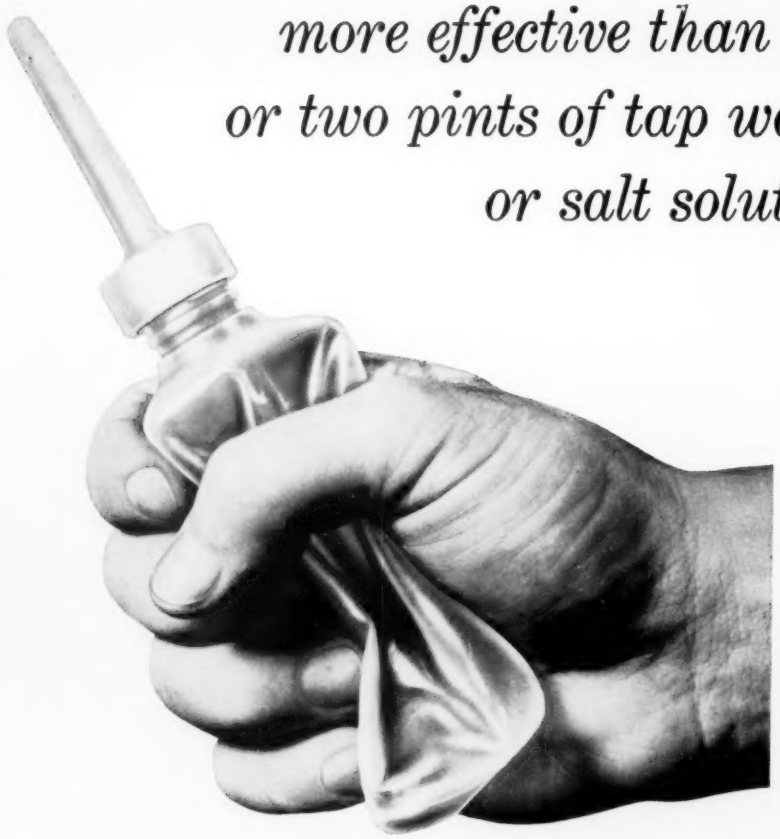

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INDUSTRIAL MEDICINE AND SURGERY
JULY, 1956

Toxicity of Ozone

I. Acute Toxicity

SIDNEY MITTLER, DELORES HEDRICK, MAURICE KING, and ALLAN GAYNOR
Chemical Engineering Research Section, Biology and Bacteriology Research Group
Armour Research Foundation, Chicago

THE TOXICITY of ozone has become an increasingly important problem with the rapid advances in aviation because a layer of ozone exists in the upper atmosphere. Research has been undertaken to determine the possible effects of ozone on aviation personnel.

The pioneer work of Fabry and Buisson[1] and Dobson and Harrison[2] in measuring the intensity of the ultraviolet absorption band in the solar spectrum established that ozone exists in the upper atmosphere. Further research in more recent years has shown that an ozone layer exists in fairly high concentrations above a height of 18 km. From an analysis of the data obtained from "Operation Sky Hook" it appears that the occupants of a pressurized aircraft will be exposed to 4 ppm by wt. of ozone at 65,000 ft. The ozone concentration rapidly rises to a peak at 23 km or 75,458 ft. so that when atmosphere at this altitude is used in pressurizing the aircraft cabin the ozone concentration in the cabin would be about 12 ppm. Johnson, Purcell, and Tonsey[4] measured the vertical distribution of ozone above White Sands Proving Grounds, New Mexico, by means of small spectrographs installed in V-2 rockets. The maximum concentration of ozone occurred at 23.5 km on October 10, 1946, and at 18.5 km on April 2, 1948.

There is much confusion in the literature as to the actual toxicity of ozone. This can be readily noted in the review papers by Thorp,[5] Weaver,[6] and Stokinger.[7] For example, Hill[8] stated that ozone is not poisonous in any sense of the word, but the threshold limit value of ozone as adopted by the American Conference of Governmental Industrial Hygienists[9] in April, 1955, was 0.1 ppm by volume, which places ozone in the same toxicity category as some toxic war gases. Thorp[5] pointed out that these discrepancies may be due to use of crude ozonizers with high current densities, the use of unreliable methods for ozone analysis, and the use of many different units in reporting ozone concentration (i.e., parts per million by volume, parts per million by weight, milligrams per liter, and percent). Such variation in units does not allow for direct comparison of concentration reported by the different investigators.

In this report the ozone concentration is reported in parts per million by weight, unless otherwise designated.

A study of the toxicity of ozone was undertaken at Armour Research Foundation to help clear the distorted toxicity picture. Extreme care was taken to exclude from the ozone generator and connecting system all organic material which might decompose and contaminate ozone. Thus, glass, aluminum, and stainless steel were the principal materials utilized. The water-cooled

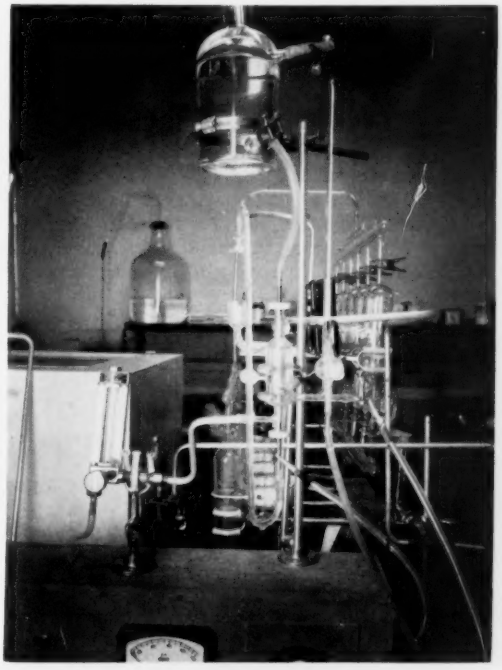

Fig. 1.
Corona discharge ozonizer.

This study was supported by funds provided under Contract AF 18(600)-944 with the USAF School of Aviation Medicine, Randolph Field, Texas.

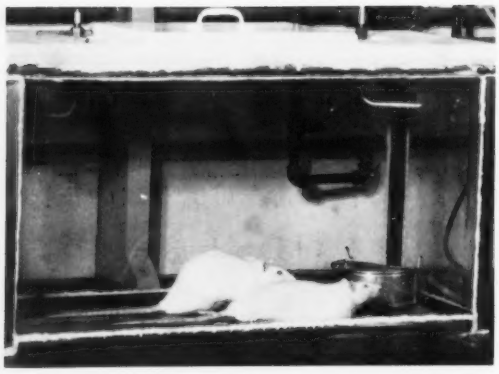

Fig. 2.
Glass ozone chamber.

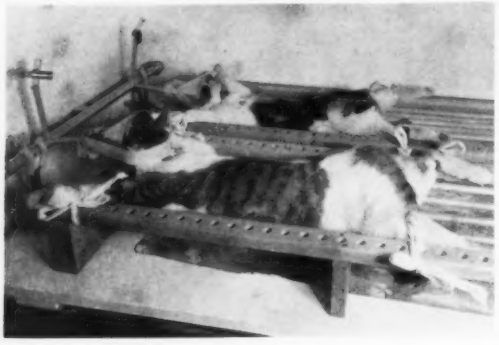

Fig. 3.
Modified Henderson method of administering ozone in acute toxicity experiments.

corona discharge-type ozonizer (Fig. 1) used was developed by Armour Research Foundation personnel in other research in the field of ozone technology. Dry filtered air or oxygen is passed through a 1/16-in. annular space and approximately 45 ppm of ozone is produced at an input of 4.5 l./min. of air at a current of 0.09 ma using a 6,000-v neon sign transformer. The 2- to 60-ppm ozone production was regulated by controlling the amount of air to the ozonizer, by changing the amount of current, and by controlling dilution.

Acute Toxicity

THE ACUTE TOXICITY of ozone was determined for the following animals: two-month-old 3B Swiss strain mice, two- to three-month-old Wistar rats, two- to three-month-old short-hair University of Chicago strain guinea pigs, three-month-old New Zealand white rabbits, and cats of undetermined origin and age.

Two methods of administering ozone to the animals were used. In one, a large glass aquarium 12½ in. x 30 in. x 16 in. was converted into an air-tight chamber (Fig. 2) with an aluminum inlet tube at one end and an aluminum outlet tube at the other. To equalize decomposition of ozone on the surface of the animals, the mice were exposed in groups of 10, rats in groups of five, and guinea pigs in groups of four. The air flow containing ozone was maintained above 10 l./min. The larger animals, rabbits and cats, were exposed to ozone by means of a funnel (Fig. 3). Each group of animals was exposed at a given concentration, usually in the range from 10 to 60 ppm for three hours. Usually most of the deaths occurred during and 24 hours after the ozone exposure; the number of survivors was determined a week after the exposure.

Some general observations were made about acute ozone poisoning. The animals become very quiet and seem to doze 15 min. after exposure to ozone began. During the second hour of exposure, if the concentration was high, breathing became rapid and labored; if the animal was free to move, it staggered about gasping for air. Death usually occurred in those animals which oozed edematous fluid from the nostrils. Every autopsy of an animal killed by ozone showed extensive hemorrhage from the capillaries in the lungs and considerable edematous fluid in the respiratory system which may cause death by asphyxiation.

The LD_{50} was calculated by the method of Reed and Muench[10] which involves plotting the percentage of cumulative deaths and cumulative survivals against the concentration. The intersection of the two lines represents the LD_{50}. This method tends to equalize chance variations because it utilizes the large total number of animals consisting of small groups of animals each exposed at a different concentration.

A modified aluminum chloride-buffered potassium iodide method[11] was used to determine the ozone concentration. (This method was tested along with other methods, and proved to be the best method available in the range used in the experiments (2-60 ppm).)

One hundred mice in groups of 10 were exposed for three hours to ozone produced from dry air at concentrations ranging from 12 to 36 ppm. The data are presented in Table I, and the plot for the LD_{50} (Fig. 4) indicates that it is 21 ppm of ozone for three hours.

There was some question as to whether ozone made from air is more toxic than ozone made from oxygen. Pure oxygen instead of air was passed through the corona discharge ozonizer and the resulting ozone and oxygen mixture was di-

TABLE I.
SURVIVAL OF MICE EXPOSED TO VARIOUS CONCENTRATIONS OF OZONE MADE FROM DRY AIR
(Three-hour exposure)

			Cumulative				
Ozone, ppm	Deaths	Survivals	Deaths	Survivals	Total	Deaths, %	Survivals %
12.0	4	6	4	50	54	7.4	92.6
12.9	2	8	6	44	50	12.0	88.0
16.5	7	3	13	36	49	26.6	73.4
17.7	2	8	15	33	48	31.1	68.9
19.4	3	7	18	25	43	41.8	58.2
21.4	2	8	20	18	38	52.6	47.4
24.6	8	2	28	10	38	73.7	26.3
25.0	6	4	34	8	42	81.0	19.0
26.2	7	3	41	4	45	91.1	8.9
36.3	9	1	50	1	51	98.0	2.0

luted with nitrogen in a ratio of 1 to 4. This ozone made from oxygen was just as toxic as ozone made from dry filtered air free of organic impurities, for the LD_{50} for 86 mice was also found to be 21 ppm for a three-hour exposure. These data are reported in Table II and Fig. 5. Thus, the ozone produced by the corona discharge ozonizer can be regarded as producing pure ozone when the air is dry and free of organic impurities. (The Ozone Technology group here at Armour Research Foundation had verified this by chemical analysis in other work with this type of ozonizer.)

Eighty-eight two- to three-month-old Wistar strain albino rats were exposed, usually in groups of five, to concentrations of ozone ranging from 14.3 to 39.4 ppm for three hours. The LD_{50} was found to be 21.8 ppm as determined by the plot in Fig. 6 from the data in Table III.

Sixty-three two- to three-month-old guinea pigs were exposed, in groups of four, in the glass chamber for three hours to ozone in concentra-

TABLE II.
SURVIVAL OF MICE EXPOSED TO VARIOUS CONCENTRATIONS OF OZONE MADE FROM OXYGEN AND DILUTED WITH NITROGEN
(Three-hour exposure)

Ozone, ppm	Deaths	Survivals	Cumulative Deaths	Cumulative Survivals	Total	Deaths, %	Survivals, %
11.7	1	9	1	53	54	1.9	98.1
13.3	3	5	4	44	48	8.3	91.7
15.1	2	8	6	39	45	13.3	86.7
20.5	22	26	28	31	59	47.5	52.5
27.0	10	0	38	5	43	88.5	11.5
28.6	5	5	43	5	48	89.5	10.5

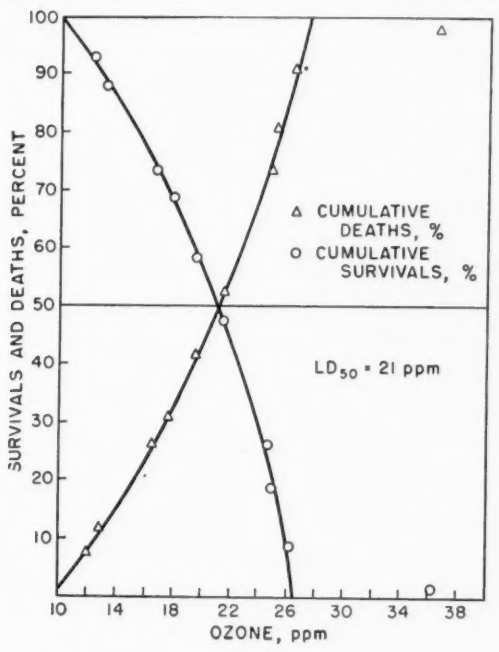

Fig. 4.
LD_{50} for mice exposed to ozone made from dry air. (Three-hour exposure)

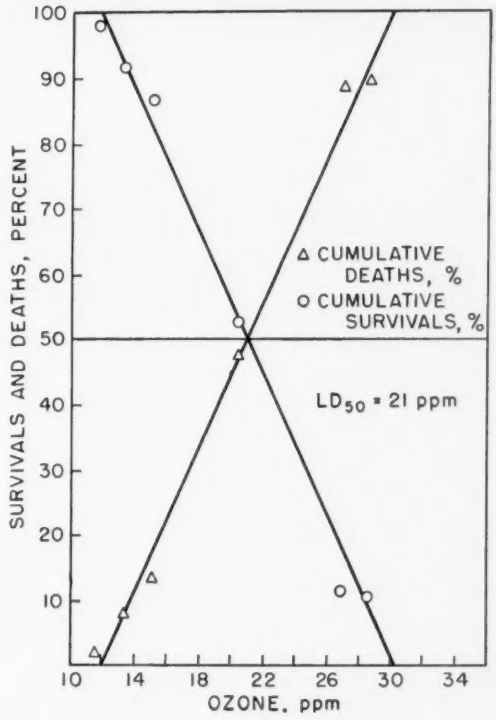

Fig. 5.
LD_{50} for mice exposed to ozone made from oxygen and diluted with nitrogen. (Three-hour exposure)

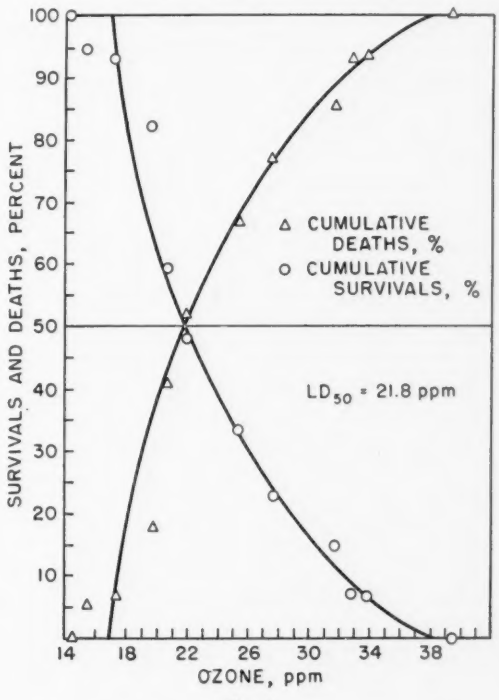

Fig. 6.
LD_{50} for rats exposed to pure ozone. (Three-hour exposure)

tions ranging from 30.4 to 62.8 ppm. The survival data are presented in Table IV, and the LD_{50} is 51.7 ppm (Fig. 7).

Thirty-eight rabbits were exposed by the funnel method to ozone in concentrations ranging from 21 to 50 ppm for three hours. The data of survivals and deaths are recorded in Table V. The Reed-Muench plot of the data (Fig. 8) gives an LD_{50} of 36 ppm for a three-hour exposure.

Fourteen cats were exposed to pure ozone for three hours by the funnel method. The cats were anesthetized with sodium pentobarbitol (40 mg/kg) in order to hold the head of the animal in the funnel and to prevent undue struggling. The data on survival are presented in Table VI, and the LD_{50} was 34.5 ppm (Fig. 9).

Subacute Toxicity

IN THE SUBACUTE TOXICITY experiments, the animals were exposed for various periods of time to concentrations which are now known to be non-lethal. This was done to determine the relationships between length of exposure, ozone concentration, and first symptoms of ozone poisoning. Lung injury was assessed by the Joffe's modification[12] of Rahn's method based on the ratio of the weight of the lungs as removed from the animal and after drying. The presence of edema, or blood as a result of hemorrhage, causes a greater wet lung weight and thus a higher ratio; in this method each lung serves as its own control.

Table VII is the wet-to-dry-weight ratio of control animals. Table VIII contains the data obtained for guinea pigs exposed to various concentrations of ozone for 18 hours. It should be noted that exposure to concentrations of 6 ppm and above resulted in hemorrhagic lungs. During

TABLE III.
SURVIVAL OF ALBINO RATS* EXPOSED TO VARIOUS CONCENTRATIONS OF PURE OZONE
(Three-hour exposure)

Ozone, ppm	Deaths	Survivals	Cumulative Deaths	Cumulative Survivals	Total	Deaths, %	Survivals, %
14.3	0	5	0	41	41	0.0	100.0
15.4	2	8	2	36	38	5.3	94.7
17.2	0	5	2	28	30	6.7	93.3
19.7	3	10	5	23	28	17.9	82.1
20.6	4	1	9	13	22	40.9	59.1
21.9	4	0	13	12	25	52.0	48.0
25.3	11	4	24	12	36	66.7	33.3
27.6	3	2	27	8	35	77.1	22.9
31.6	8	3	35	6	41	85.3	14.7
32.8	5	0	40	3	43	93.0	7.0
33.8	2	3	42	3	45	93.3	6.7
39.4	5	0	47	0	47	100.0	0.0

*Average body weight - 200 g.

TABLE IV.
SURVIVAL OF GUINEA PIGS* EXPOSED TO VARIOUS CONCENTRATIONS OF PURE OZONE
(Three-hour exposure)

Ozone, ppm	Deaths	Survivals	Cumulative Deaths	Cumulative Survivals	Total	Deaths, %	Survivals, %
30.4	0	5	0	34	34	0.0	100.0
33.7	0	5	0	29	29	0.0	100.0
41.1	1	8	1	24	25	4.0	96.0
42.3	3	2	4	16	20	20.0	80.0
45.6	1	4	5	14	19	26.3	73.7
51.5	4	0	9	10	19	47.4	52.6
53.0	4	6	13	10	23	56.5	43.6
58.5	7	3	20	4	24	83.3	16.7
60.3	4	1	24	1	25	96.0	4.0
62.8	5	0	29	0	29	100.0	0.4

*Average body weight - 325 g.

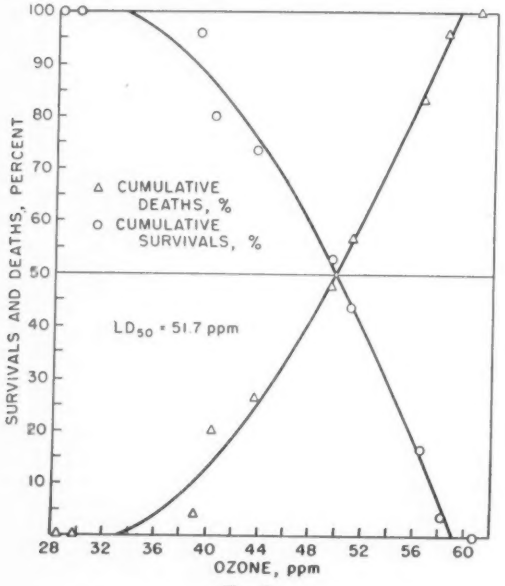

Fig. 7.
LD_{50} for guinea pigs exposed to pure ozone.
(Three-hour exposure)

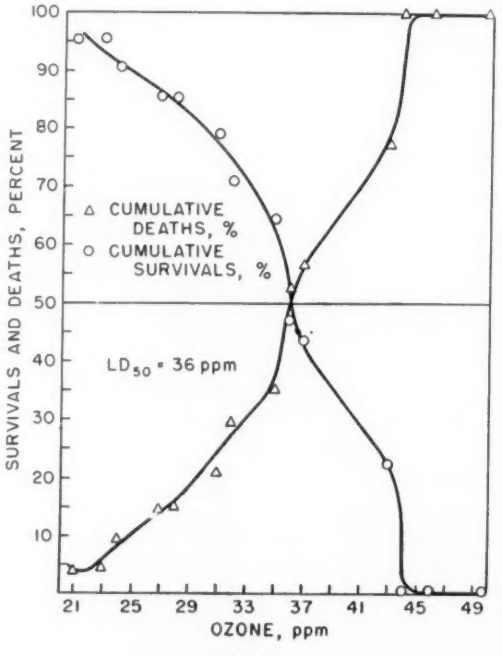

Fig. 8.
LD_{50} for rabbits exposed to ozone.
(Three-hour exposure)

ozone exposure the lungs take on a mottled appearance as a result of the rupture of the small capillaries in the lung, and then edema and resulting swelling occur.

TABLE V.
SURVIVAL OF RABBITS EXPOSED TO VARIOUS CONCENTRATIONS OF PURE OZONE
(Three-hour exposure)

Ozone, ppm	Deaths	Survivals	Cumulative Deaths	Cumulative Survivals	Total	Deaths, %	Survivals, %
21	1	1	1	22	23	95.7	4.3
23	0	2	1	21	22	95.6	4.4
24	1	1	2	19	21	90.5	9.5
27	1	1	3	18	21	85.7	14.3
28	0	2	3	17	20	85	15
31	1	3	4	15	19	79.0	21
32	1	1	5	12	17	70.6	29.4
35	1	3	6	11	17	64.7	35.3
36	3	1	9	8	17	47.1	52.9
37	0	2	9	7	16	43.7	56.3
42	0	2	9	5	14	34.7	65.3
43	1	3	10	3	13	23	77
44	2	0	12	0	12	0	100
46	2	0	14	0	14	0	100
50	2	0	16	0	16	0	100

TABLE VI.
SURVIVAL OF CATS EXPOSED TO VARIOUS CONCENTRATIONS OF PURE OZONE
(Three-hour exposure)

Ozone, ppm	Deaths	Survivals	Cumulative Deaths	Cumulative Survivals	Total	Deaths, %	Survivals, %
29	4	0	8	0	8	100	0
30	1	1	4	1	5	80	20
33	1	1	3	2	5	60	40
36	1	1	2	3	5	40	60
46	0	2	1	5	6	16.6	83.4
64	1	1	1	6	7	14.3	85.6

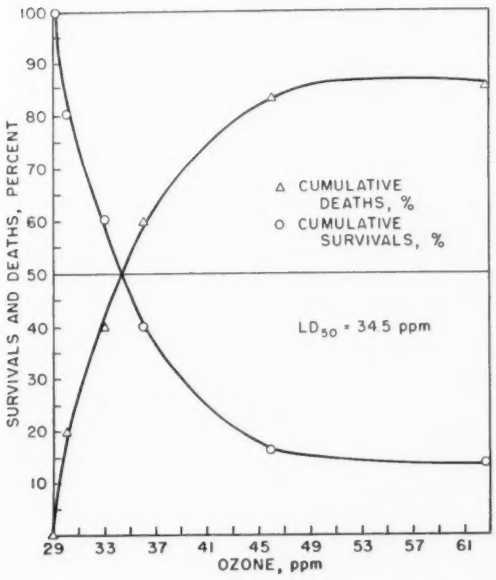

Fig. 9.
LD_{50} for cats exposed to ozone.
(Three-hour exposure)

Albino rats which are more sensitive to ozone than guinea pigs have hemorrhagic lungs after 18 hours' exposure at 5 ppm; the data are presented in Table IX.

Albino rats were then exposed to concentrations below 4 ppm for 20, 22, and 24 hours; no lung damage was found after exposure to ozone concentrations of 3.3 ppm or less. The data from this series of experiments are presented in Table X.

TABLE VII.
RATIO OF WET TO DRY LUNG WEIGHT OF CONTROL ANIMALS

Species	No. of Animals	Mean Ratio	Standard Deviation	Standard Error of Mean
Rabbit	20	4.543	0.180	0.043
Mouse	24	4.671	1.067	.217
Rat	25	4.532	0.104	.0208
Guinea pig	26	4.802	0.184	0.0307

TABLE VIII.
EFFECTS OF EXPOSING GUINEA PIGS* TO SUBACUTELY TOXIC CONCENTRATIONS OF OZONE FOR 18 HOURS

Ozone, ppm	Lungs: Ratio**	Lungs: Gross Appearance
3.9	4.56	All normal
4.7	4.57	All normal
5.1	4.74	Two hemorrhagic
6.0	5.40	All slightly hemorrhagic
6.1	4.73	All slightly hemorrhagic

*Four guinea pigs were exposed at each concentration.
**Wet/Dry weight.

TABLE IX.
EFFECTS OF EXPOSING RATS* TO SUBACUTELY TOXIC CONCENTRATIONS OF OZONE FOR 18 HOURS

Ozone, ppm	Lungs: Ratio**	Lungs: Gross Appearance
3.6	4.46	Normal
3.7	4.48	Normal
3.8	4.24	Normal
4.0	4.26	Normal
4.4	4.62	Four slightly hemorrhagic
5.0	4.83	All hemorrhagic
5.1	5.77	All hemorrhagic
5.8	4.85	All hemorrhagic
6.0	5.01	All hemorrhagic and edematous
7.4	5.42	All hemorrhagic and edematous
7.5	5.69	All hemorrhagic and edematous
7.7	—	All hemorrhagic and edematous

*Five rats were exposed at each concentration.
**Wet/Dry weight.

TABLE X.
EFFECTS OF EXPOSING RATS TO SUBACUTELY TOXIC CONCENTRATION OF OZONE

Exposure, hr	Ozone, ppm	No. of Animals	Ave. Body Weight, g	Lungs: Ratio*	Lungs: Gross Appearance
20	3.0	4	292	4.11	Normal
	3.3	4	275	4.23	Normal
	3.5	4	144	4.19	Normal
	3.8	4	286	4.98	Three slightly hemorrhagic
	4.4	4	152	4.24	One slightly hemorrhagic
22	2.8	4	328	4.48	Normal
	3.2	5	357	4.1	Normal
	3.5	5	172	4.50	Three slightly hemorrhagic
	3.5	5	211	4.41	Normal
	4.1	5	166	4.61	Five slightly hemorrhagic
24	2.9	5		4.25	Normal

*Wet/Dry weight.

Comment

THERE IS apparently no relationship between the weight of the animals and ozone toxicity. Rats and mice have approximately the same LD_{50} for ozone, 21 ppm for a three-hour exposure, although the average weight of the albino rats is 220 g and of the mice 21 g. Guinea pigs whose average weight was 325 g had a LD_{50} of 51.7 ppm. The average weight of rabbits used in the experiments was 2151 g and that of the cats 2499 g while the LD_{50} for these animals was 36 and 34.5 ppm, respectively. There does exist a definite relationship between weight and the basal metabolic rate of a species; the larger the species, then usually the lower the metabolic rate. The mouse with a proportionally high metabolic rate does not exhibit undue susceptibility toward ozone, while the guinea pig with one-eighth the weight of rabbits and cats exhibits a marked resistance to ozone. One explanation for the toxicity differences between species is that ozone is a very reactive gas and does decompose or react readily on moist, organic surfaces. Apparently more ozone is decomposed or reacts in the upper respiratory tract (nasal and pharynageal regions) of some species than of others. More harm is done by the ozone which reaches the alveolar spaces and the bronchioles than in the upper regions of the respiratory tract.

Ozone is indeed a toxic gas so that at the present stage of research the authors warn that exposures to ozone for periods longer than three hours should be limited to 3 ppm or less. The toxicity of ozone may be compared to other gases in a threshold limit value list published recently.[9] Man can be exposed without harm eight hours a day to 1 ppm (by volume) of chlorine; 10 ppm of hydrogen cyanide; and 100 ppm of carbon monoxide. Investigation of the effects of intermittent and of long exposures to concentrations of ozone below 6 ppm is now under way. The effect of oxygen, carbon dioxide, and other gases, including organic impurities, on the toxicity of ozone is also being studied.

Summary

OWING to the existence of a layer of ozone in the upper atmosphere and its possible effect on aviation personnel, the acute and subacute toxicity of ozone for several laboratory animals was investigated. The LD_{50} for a three-hour exposure of ozone was found to be 21 ppm for mice, 21.8 ppm for rats, 34.5 ppm for cats, 36 ppm for rabbits, and 51.7 ppm for guinea pigs. Edema occurred in the lungs of rats exposed to 6 ppm for 18 hours; no damage was caused by 24-hour exposure to concentrations of less than 3 ppm ozone.

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Care of the Executive

MANY business men are making annual physical examinations a habit, and we believe that firms should encourage all their executives to do so when they reach the age of 50—at company expense. Such a policy has already been adopted by a good many concerns. A great deal of money is spent to train an executive who, when he achieves a responsible position, is likely to be 50, or close to it. He may look and feel fine, but only a thorough examination will disclose what, if anything, the wear and tear of his years of training have done to his system. It is equally important to him and to his employers to know how he has weathered them. Executives are under stress, which sometimes brings on coronary thrombosis. A medical examination will not reveal an impending heart attack, but when a physician has all the medical findings about a man at hand and knows his habits and diet the advice can have a bearing on the patient's future health. There is a great deal of justified concern over the 95,000 Americans who died in accidents in 1953 but the number who neglect each year to see a physician in time to save or prolong their lives is probably much larger. As Dr. Van Dellen has written, periodic examination offers a positive approach to the maintenance of good health. Heads of businesses must know how the loss of two or three top men in a year can cripple a concern; knowing that, they should do all that is possible to keep it from happening to them.

—Editorial, *Chicago Tribune*, May 26, 1956.

Return to Full Duty Following Surgery

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ARE WE wasting days in unnecessary convalescence?

Convalescence from a surgical procedure is not an unmixed benefit to the patient. The restricted activity or the bed rest required changes his physiology, and sometimes this change is for the worse. The adverse affects of bed rest or unusual enforced restrictions in activity are well known. The appetite suffers, elimination is impaired, circulation slows, muscles waste, metabolism slows, and even the weight is reduced. Mentally the patient suffers from psychologic problems caused by separation from friends and from normal activity, and from worry about himself. Actually healing of trauma is accelerated as a result of activity in some cases. An example is the increased rate of repair seen in leg fractures when the patient is in a walking cast as compared with when he is kept immobilized in bed.

Can this period of "Dr. Jekyl—Mr. Hyde" convalescence be shortened to the benefit of the patient?

A comparison between two large industries, a public health survey, an insurance company's experience, and Air Force experience in the number of days lost after certain common surgical procedures reveals that there are significant differences between the experiences of these groups (Fig. 1). Rather large variations in experience are seen, but in general the Air Force is returning men to duty after about one-half to two-thirds as long a convalescent period. Because of probable differences in methods of gathering figures, it may not be assumed that the differences seen in this chart are quantitative, but the difference is great enough and consistent enough to conclude that the experiences are not equal.

The figures presented are based on a random sample of cases occurring in the period under consideration. These are cases in which the diagnosis studied was the sole diagnosis. Only military patients who returned to duty are included. Females are not broken out of the sample, for their number is so small as be insignificant. The data may be safely considered to be representative of males only.

The days lost following five common surgical procedures (Fig. 2) and following five common traumatic conditions (Fig. 3) represent what seem to be reasonable periods of average convalescence prior to return to work. Time lost after fractures may seem unreasonably low until explanation is made that, when feasible, men are returned to partial duty with casts on. Admittedly there are some things these men can not do with casts, but there is much they can do. It is felt that here is a significant gain in man-hours as a result of returning these orthopedic cases to duty while they are still in casts. It is also felt that his early reurn to duty is good therapy. The patient has fewer problems engendered by long hospitalization and long periods of absence from usual activities and contacts. The beneficial effect of ambulating a patient in a walking cast under proper conditions has long been recognized.

If shorter convalescence after common surgical procedures is to be advised one must be sure that

COMPARISON OF DAYS LOST

	LARGE INDUSTRIES A	LARGE INDUSTRIES B	PUBLIC HEALTH SURVEY, BALTIMORE	NEW JERSEY INSURANCE COMPANY	U.S. AIR FORCE
TONSILLECTOMY	13.2		9.1		7.7
HERNIORRHAPHY	33.6	51	72.9	57	19.9
APPENDECTOMY	23.9♂ 31.1♀	32 ♂ 40 ♀	19.3	43	13.5
HEMORRHOIDECTOMY		36	33.6	35	13.0

Fig. 1.

DAYS LOST TO AIR FORCE

	NUMBER OF CASES IN SAMPLE	DAYS LOST
TONSILLECTOMY	788	7.7
HERNIOPLASTY INGUINAL	639	19.9
APPENDECTOMY (ACUTE, UNCOMPLICATED)	967	13.5
HEMORRHOIDECTOMY	502	13.0
PILONIDAL CYSTECTOMY	390	31.5

Fig. 2.

Presented as part of the Symposium on "The Optimum Time for Return to Work Following Various Major Disabilities," Forty-First Annual Meeting, INDUSTRIAL MEDICAL ASSOCIATION, Philadephia, April 25, 1956.

DAYS LOST TO AIR FORCE

	NUMBER OF CASES IN SAMPLE	DAYS LOST
SIMPLE FRACTURE RADIUS AND ULNA	65	22.2
SIMPLE FRACTURE TIBIA AND FIBULA	128	38.7
SPRAINS, SHOULDER	62	5.4
SPRAINS, ANKLE	880	5.3
SPRAINS, SACROILIAC	409	7

Fig. 3.

harm to the patient will not result. Indirect evidence that early return to duty is not harmful may be gleaned from the evidence of pulmonary embolus after surgery and from the incidence of recurrence of inguinal hernia (Fig. 4). Following about 5,700 cases of surgery reported in 1953, there were no reports of cases of pulmonary embolus. This is not conclusive evidence that there were no cases of pulmonary embolus in the Air Force. However computations based on statistical theory tell us that if there were as many as 20 or 30 cases of pulmonary embolus following surgery in the Air Force experience during 1953 (consisting of some 57,000 surgical operations) it would be most surprising not to find at least one of these in the sample of cases reported in this study. In some 7,200 surgical cases reported for the year 1952 (representing an experience of some 72,000 surgical cases) one case of pulmonary embolus did appear. This seems a reasonable indication that the occurrence of pulmonary embolus after surgery in the Air Force is extremely low.

The incidence of recurrent hernias (27 out of 639 hernioplasties done) may also be an indication of rates of complications. Since this recurrence rate is less than 4.25% it seems that disaster is not being courted by early ambulation and return to duty.

If the material presented here indicates that convalescent periods shorter than is customary have been used, it might be appropriate to speculate as to some of the reasons for this experience.

COMPLICATIONS AS RESULT OF AIR FORCE REGIME

	TOTAL CASES IN PERIOD CONSIDERED	NUMBER OF CASES IN SAMPLE	COMPLICATION TYPE	COMPLICATION NUMBER
ALL SURGERY (1952)	72,000	7,000	PULMONARY EMBOLUS	1
ALL SURGERY (1953)	57,000	5,700	PULMONARY EMBOLUS	0
HERNIOPLASTIES	6,300	639	HERNIOPLASTIES DONE FOR RECURRENCES	27 (4.22%)

(The round figures above are approximations)

Fig. 4.

CONSIDERING first the patients themselves as contributing causes to shorter convalescence, we are struck with the fact that we are dealing with an all-male group. Experience has shown that males lose less time from work due to any specific procedure than do females who have the same operation. Next it may be that the patients studied here return to duty earlier because they are better physical specimens, owing to the selection that was made of them when they entered the military service. Finally some may feel that the average age (20-29) may result in earlier return to work because of their comparative youth.

In an effort to determine the effect of age on the length of time lost due to surgical procedures, a survey was run (Fig. 5). The number of cases

AVERAGE LOST DAYS BY DIAGNOSIS AND AGE GROUP

	UNDER 20	20 - 29	30 - 39	40 - 49
TONSILLECTOMY	7.92 (48)	7.36 (230)	7.29 (17)	
INGUINAL HERNIOPLASTY	16.25 (36)	16.41 (132)	15.29 (41)	
APPENDECTOMY	12.68 (72)	12.12 (218)	15.47 (30)	12.00 (5)
HEMORRHOIDECTOMY	15.33 (15)	12.83 (102)	11.56 (71)	10.82 (11)
PILONIDAL CYSTECTOMY	31.09 (22)	28.36 (127)	26.50 (12)	

( ): NUMBER OF CASES IN SAMPLE

Fig. 5.

in these samples is so small in age groups other than the 20-29 that variability is quite large owing to the small numbers. On the other hand there is no marked difference in the days lost by the various age groups. If there were much difference it is probable that even these small numbers would pick up some of the difference. The difference in figures under the various age groups for the same diagnosis is almost entirely within the possible error and, therefore, we must conclude that this study demonstrates no significant variation in days lost because of differences in ages.

The second group of possible reasons for differences between this study and others on days lost from duty may relate to the medical staff that cares for the patients. Surveys reveal that there is still a great difference of opinion as to the best time to return patients to duty after surgery. Recently a movement for earlier return has taken place. Most of the physicians taking care of patients in this study are in their early thirties and

therefore are recent graduates. They were exposed to this philosophy of early return to duty both in medical school and in their subsequent training, for certainly some of their staff men practiced it. The usual success of this policy has apparently convinced these physicians to try it themselves.

Another consideration pertaining to attending staff is that the physicians who cared for the patients in this study were in the same position as are most industrial physicians; they know the urgent need not to waste patient days in unnecessary convalescence. The extra cost in money and man-hours prohibits an extra day of hospitalization or convalescence.

The final group of possible reasons for earlier return of Air Force sick to full duty may be due to the organization itself. Each individual group has a job to do and when someone is out sick, the job of the squadron suffers. The man is part of the group and his loss is felt. The doctor and hospital are part of the same general organization as the patient and his parent group, therefore it is relatively simple for persuasion to be used to have the patient returned to his job at the earliest possible time.

A final cogent reason, related to the organization, is that Congress permits the Air Force to have only a certain number of men. The Air Force has a many-faceted mission and a lot of protection to give with the limited number of men. For the safety of the nation we cannot afford to have the equivalent of several fighter wings off-duty sick. This results in a strong pressure on the medical service of the Air Force to maintain a low non-effective rate in order that we can do what we must do for the country.

In summary, the figures presented suggest that patients may be returned to work earlier than is usual in many groups. Such earlier return would not adversely affect the individual returned and would probably benefit the patient, industry would save money, and insurance companies would reduce losses.

Many Areas

THE FIELD of industrial medicine and hygiene embraces many areas in need of research. Opportunities in that regard are almost limitless, not only for the medically qualified investigators, but also for members of other fields of science. The industrial hygienist, toxicologist, biochemist, physicist, engineer, physical and analytical chemists and others have joined forces with the physician to investigate the nature, prevention, and therapy of occupational disease processes. History is replete with their accomplishments, as for example the recognition and prevention of the hazards attending exposure to certain dusts and fumes of lead, mercury, arsenic-bearing ores, radioactive substances, beryllium compounds and quartz. Many other similar examples could be cited here, but in relatively few instances is the problem so clearly understood that no further study has to be done. This is true even in the case of silicosis which has been familiar to medical men for many years. Although much is known about that occupational pulmonary condition, there is still an appreciable lack of knowledge concerning the precise manner in which crystalline free silica exerts its specific toxic effects. Consequently, therapeutic measures have not been developed for silicosis even though its prevention is more or less a matter of common knowledge. Technological progress and product development have been most rapid during recent years and in many respects have expanded far beyond our knowledge of the human component which they involve. On every hand, there are new technological advances, each with an unknown and possibly hazardous element. There are new alloys, solvents, pesticides, plastics, and gases. The discharge of effluents from industrial processes to the outdoors combined with increased concentrations of diesel and gasoline engine exhausts have created serious air pollution problems in many cities. The noise and vibrations of fabrication, the biological stresses of automation, the questions pertaining to mental health absenteeism, and the problems unique to the female worker, constitute critical areas for continued study. More precise methods must be developed for measuring and evaluating the degree of disability resulting from occupational injury and disease. Finally, specific diagnostic methods and therapeutic measures including rehabilitation, must be defined if industrial medicine and hygiene are to be fully effective.

—From "Industrial Medicine and Hygiene at Wayne University," by ARTHUR J. VORWALD, M.D., PH.D., in *J. Michigan State M.S.*, March, 1956.

Occupational Hearing Loss

—WISCONSIN'S APPROACH TO THE PROBLEM

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THE CONCEPT that loss of hearing can result from exposure to loud sound is not anything new. As far back as a century ago reports were published concerning the deafness occurring in braziers, blacksmiths, boilermakers, and railroad men.[1] During and since World War II industry expanded, high-speed machines were introduced, production increased greatly, and the resultant uncontrolled noise became more intense and more frequent. Although numerous reports dealing with this problem appeared in the literature not much was heard about it until a large number of compensation cases appeared in the State of New York in 1947. Shortly thereafter, cases began piling up in Wisconsin and elsewhere.

Although all states have some form of workmen's compensation law, the provisions covering occupational hearing loss vary in the states and differ in interpretation even more.

SOME of the ways in which loss of hearing can be compensated are as follows:

1. As a scheduled award for a fixed number of weeks of compensation for either partial or total loss of hearing function,
2. For loss of either wages or reduction of wage earning capacity, due to the loss of the hearing function,
3. For loss of hearing function expressed in terms of the patient as a working unit—in other words, disability of the man as a whole.
4. By means of a judgment at common law for damages.

In spite of the various legal definitions and provisions, these are the facts. Intense industrial noise can and does cause hearing losses in susceptible workers. The degree and extent of these hearing losses are dependent upon numerous physical, acoustical, anatomical and physiological factors, the influences of which are the same in all states. Therefore, the noise problem must be considered a national one.

Most states afford the workman compensation in one form or another for loss of hearing caused by the sudden accidental event. However, it is impossible at this time to give a complete list of states in which workers can recover for loss of hearing due to exposure to injurious noise—the reason being that the laws of many states are subject to interpretation and definite determination cannot be made until the courts of last resort in such states have interpreted their particular compensation acts. Opinions of the higher courts have been handed down in New York[2] and Wisconsin.[3] Also the greatest number of claims for alleged loss of hearing due to industrial noise exposure have arisen in Wisconsin and New York. Because of the liberal provisions of the Wisconsin act and the fact that partial and total loss of hearing was compensated on a schedule basis, over 500 claims for loss of hearing were filed before the Wisconsin Commission within a period of a few years (1951-1953). In the State of New York an administrative ruling of deferring awards until the worker is removed from the injurious noise exposure for a period of six months has resulted in holding back awards for the time being. In the State of New Jersey some 232 claims were filed against a shipbuilding industry.[4] These cases have been processed mostly under Federal Court and Longshoremen's and Harbor Workers jurisdiction. Some hearing loss cases have also appeared in California, Minnesota,[5] and Missouri.[6] In Missouri the situation at the present time is quiet, pending a Supreme Court decision on a state declaratory judgment action as to the ability of the Missouri Commission to enforce its rule Number 23.

There are numerous states in which bills were introduced in the 1955 legislatures, designed to remove barriers presently existing against recovery for partial loss of hearing.

With this increasing recognition of occupational hearing loss national attention has again been focused on the State of Wisconsin and its handling of the industrial noise problem. Wisconsin, through its Industrial Commission and Legislature, has in past years demonstrated its leadership in dealing with industrial hazards as they have arisen. It will be recalled that Wisconsin had the nation's first effective state compensation law, written in May, 1911. Schedules which covered accidental injuries were adopted in 1913, at which time loss of hearing was compensated on the basis of 40 weeks of disability for total loss of hearing in one ear and 160 weeks for total loss in both ears. The Occupational Disease Act first became effective in July, 1919. Four years later a change was made placing all permanent disability on a comparative basis with permanent total disability of the body; and deafness in one ear became 5% of permanent total disability; in both ears, 33⅓%. In July, 1931, a change was made back to

Presented at the Twenty-Sixth Convention of the Central Illinois Society of Ophthalmology and Otolaryngology, April 13, 1956, Peoria, Illinois.

the former arrangement of schedules, and total loss of hearing in one ear was compensated on a basis of 50 weeks; bilateral total loss of hearing on the basis of 333⅓ weeks.

IT IS somewhat unusual, but not necessarily surprising, that although loss of hearing from occupational disease had been listed since 1919, no claims were made for alleged loss of hearing due to excessive noises until 1951. During 1951 approximately 50 claims were filed before the Wisconsin Industrial Commission. Some of these were heard before examiners, and awards were made in a few instances. As the result of these hearings it became apparent that there were many thorny medical and medical-legal questions that had to be answered.

Some of the more troublesome questions were:

1. At what level of sound intensity and over what period of exposure does hearing damage take place?
2. What was the status of the employee's hearing when he came to work for the employer? (It should be pointed out that in practically all the litigated cases there were no accurate hearing records of the employee's hearing when he began his work.)
3. What tests should be used for determining the hearing ability of the worker?
4. What formula should be used to evaluate these hearing tests and express the results in terms of hearing disability?
5. Which of several hearing tests made by several otologists at various times should be used to evaluate the hearing loss?
6. Are some workers more susceptible to noise-induced hearing loss than others?
7. How are we to determine the permanency of the hearing loss if the worker continues at his noisy employment?
8. What consideration should be given to the factor of age?
9. What consideration should be given to medical and degenerative conditions that might affect the hearing loss?

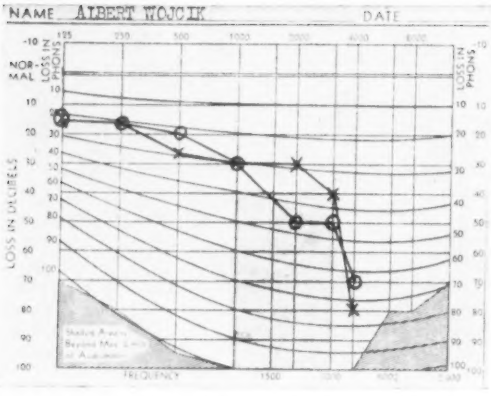
SOME of the legal questions that presented difficulty and still need further clarification are:

1. Was the law as written intended to compensate a man for loss of hearing when it did not interfere in his every-day work and he suffered no wage loss?
2. How was the time of injury in these cases to be defined?
3. How much of the hearing loss actually found could be considered to be an occupational disease?
4. How was the statute of limitations to be applied?
5. When a worker had been employed by various industries each of which may have contributed to his hearing loss, how was the apportionment of the hearing loss to be made?

THE following factual information and legal developments are taken from an address by Mr. Harry A. Nelson, Director of Workman's Compensation, State of Wisconsin, before the American Laryngological, Rhinological and Otological Society, Boston, May 26, 1954:[7]

"The Wisconsin Industrial Commission, after hearing several previous cases, decided to take testimony in the case of *A. Wojcik vs. Green Bay Drop Forge Company*,[8] and to send this case to the higher courts for review and opinion. The facts were essentially as follows: This drop forge worker, 60 years of age, had worked in noise of a kind and over a sufficient period to result in a loss of hearing some of which was permanent. The medical testimony established that Mr. Wojcik had a bilateral nerve type hearing loss at the time the case was heard, amounting to 31.09% disability. The percentage of hearing disability was based upon the American Medical Association table of 1947.[8] The Commission decided that Mr. Wojcik had sustained a bilateral hearing loss as the result of his employment in the drop forge plant and handed down an award in his favor. The Commission in this case decided that the 'last day of work' would be considered as the last day of work before the filing of the claim. It was the opinion of the Commission that the schedule having existed was to be applied to occupational disease as well as accidental injury. The Commission decided that from the above award of 31.09% of hearing disability a reduction should be made because of presbycusis (loss of hearing which accompanies advancing age.) Accordingly a reduction of 7.07% was made for this factor. In addition under the Wisconsin statute there is a requirement that the number of weeks payable for permanent disability be reduced by 2.5% for each year over 50. As for the question of permanency of the hearing loss, inasmuch as Mr. Wojcik had continued to work in the noisy environment it was established by medical testimony that any improvement would not amount to more than 25%, leaving 75% of the resultant loss as being due to his work exposure. Therefore, when all of these deductions were made there was a net loss of 13.5% residual binaural hearing loss which amounted to compensation in the sum of $1575.46. Therefore, an award for this amount in favor of Mr. Wojcik was handed down by the Industrial Commission of Wisconsin (Fig. 1).

"The Wojcik case was appealed to the Circuit Court of Dane County which reversed the findings of the Industrial Commission. Judge H. W. Sachtjen, of the Circuit Court,[9] gave his opinion as being that there had been no last day of work and that before compensation could become due for an occupational disease an employee must have suffered disability, represented by physical incapacity to work and wage loss. The Court further stated the opinion that the schedule of fixed benefits did not apply to occupational disease. The Court added that no hardship would be worked on Wojcik since he was still employed without wage loss, and that if and when his employment was terminated and wage loss resulted, he would then be entitled to claim compensation. In the meantime, if the legislature wished, it could change the rule. Employers could also sup-



X—Hearing Loss in Left Ear—29.1%

A.M.A. Formula

O—Hearing Loss in Right Ear—42.4%

$$\frac{(29.1\% \times 5\text{-}2/3) \text{ Plus } 42.4\%}{6\text{-}2/3} = 31.09\%$$

Loss of Hearing in Both Ears
(Wisconsin Method for Binaural Loss)

31.09%
-7.07% (Not Due to Injury) Presbycusis = 24.02%
24.02%
-6. % (25% Statutory Reduction for Age—60) = 18.02%
75% of 18.02% = 13.511% (Permanency)
333-1/3 Weeks x 13.511% = 45.04 Weeks at $35.00 a Week.

Fig. 1.
Audiogram and disability in Wojcik case.

ply safety devices to prevent or minimize exposure to noise.

"The case was then appealed to the Wisconsin Supreme Court. The Supreme Court rendered its opinion on October 6, 1953.[3] In its decision the Court upheld the original findings and order of the Commission and reversed the findings of the Circuit Court.

"It held that wage loss was not necessary in order to establish a claim for loss of hearing by prolonged exposure to noise; that the last day of work applied only in cases where an employee had actually quit his work, and that the Commission had properly fixed the day before the filing of the application as the date of liability. (That was the approximate date of the examination on which claim was based.)

"It further held that termination of employment was not a condition precedent to establishment of claim. It stated that loss of hearing was disability established by schedule within the view of the statute, and that such cases were therefore compensable. Any other finding, the court held, would be absurd and unreasonable.

"On application for rehearing (many briefs filed) the court reiterated its decision affirming the Commission's order.

"For many years the Wisconsin Commission has maintained an Advisory Committee on workmen's compensation legislation. This is composed of representatives of industry, labor and insurance carriers. When unanimous agreement is reached by this committee on proposed changes, they are usually adopted by the legislature.

"When this Committee considered the subject of occupational loss of hearing, it came to the conclusion that the law was uncertain, difficult of enforcement, and productive of expensive litigation. It felt that, because of medical and legal uncertainties and possible devastating economic results, it should be changed at least temporarily, to permit study toward future legislation."

By a "Gentlemen's Agreement" the Advisory Committee recommended to the legislature that an interim law be adopted placing loss of hearing due to prolonged exposure to industrial noise on the same basis as non-disabling silicosis. This law was based on a wage loss and became effective in Wisconsin on July 1, 1953.[10] Between 1951 and July 1, 1953, 441 claims for loss of hearing were filed before the Commission (chiefly drop forge and foundry workers). In addition 81 cases were filed shortly after July 1, 1953, the effective date of the new law.

Because of the humanitarian, medical, social and economic aspects of the noise problem, two important committees were formed in Wisconsin to study the problem and guide those involved. The State Medical Society of Wisconsin, through its Committee on Visual and Hearing Defects, appointed a Medical Sub-Committee to investigate the noise problem. The Committees main objective was *hearing conservation*. The report of this group was published by the State Medical Society under the title, "Hearing Conservation Programs for Wisconsin Industries" (June, 1954, and revised February, 1956)[11] Copies of this guide may be obtained by writing to the Secretary of the Medical Society of Wisconsin, Madison, Wisconsin. This guide does not consider the compensatory or legal aspects of the problem.

The second Medical Committee was appointed by the Wisconsin Industrial Commission upon recommendation of its Advisory Committee. It consisted of four otologists and an industrial physician. The function of this group was to advise the Industrial Commission and its advisory group on the medical-legal aspects of the problem. Some of the more important recommendations of the Medical Advisory Committee to the Commission follow:

In brief, it was recommended that sound below 90 decibels, measured on a C scale of an approved sound-level meter, should not be considered harmful regardless of length of exposure. The sound-pressure level per octave band would determine the hazardous noise level. The inference to be drawn is that when there is noise above 90 decibels employers should be on their guard.

For purposes of compensation, losses would be confined to those occurring for frequencies ordinarily used for speech conversation. Losses of hearing ability for tones above 2000 cycles per second would not be considered to constitute disability for hearing ordinary conversation. Although it was recognized that speech audiometers have considerable value, it was felt that they could not be adopted until their use was accepted

and standardized. Pure tone air conduction audiometric tests were recommended for evaluating hearing acuity, using the readings of 500, 1000 and 2000 cycles per second.

The Committee recommended that the average hearing loss be defined by the sum of the losses at the three test frequencies divided by 3. By means of a table the hearing loss would then be converted into percentage loss (Table I). Losses averaging 16 decibels or less would not constitute hearing disability, and losses of 80 decibels and over would constitute total deafness. To each average hearing loss between 17 and 79 decibels would be ascribed a percentage of compensable hearing loss. An average loss of 35 decibels corresponds to 30%, 47 decibels to 50%, 60 decibels to 71.7% and 80 decibels to 100%. For binaural loss the ratio of hearing in one ear to loss in both ears shall be considered to be 1:5. Loss due to presbycusis would be subtracted at the rate of 0.5% at age 50, and an additional 0.5% for each year thereafter. Since recovery of hearing may ordinarily be expected after removal from a noisy environment, and since the amount of recovery depends on years of exposure, degrees of loss, and individual susceptibility, etc., it is recommended that a first examination be made after 48 hours' removal, followed by closely spaced periodic tests. To allow for the "recovery factor," 5 decibels would be deducted from the average losses at the 500, 1000, and 2000 cycles. The result would be considered the final permanent loss, as of the time of examination so made, except for persons who had been removed from the noise for six months or longer, in which case the final determination could be made from actual readings. Any improvement by hearing aid would not be considered in the evaluation. The Committee was of the opinion that the hearing loss cannot be improved by medical or surgical treatment.

Members of the Medical Advisory Committee emphasized that their proposals cannot be recommended as definitive but are based on the best scientific information now available, subject to revisions as additional information accumulates.

The Advisory Committee to the Industrial Commission held many meetings to consider the acceptance of the medical committee reports and to formulate amendments which covered such aspects as how, when, and to what extent the worker is to be compensated for his hearing loss.

THE NEW Wisconsin amendments pertaining to occupational hearing loss became effective July 1, 1955.[12] These new amendments define occupational deafness and the industrial environment capable of producing same. A schedule has been provided for partial as well as total hearing loss. This schedule allows up to 32 weeks for compensation for total deafness of one ear and 160 weeks for total deafness of both ears. Employees may file claims for occupational loss of hearing six months after any of the following events provided they remain away from injurious noise for that length of time.

1. Transfer because of occupational deafness to non-noisy environments.
2. Retirement.
3. Termination of employer-employee relationship.
4. Layoff for one year, the last six months of which is away from injurious noise.

Hearing disability is to be determined on the basis of the formula recommended by the Medical Advisory Committee to the Wisconsin Industrial Commission (Table I).

In one provision the Wisconsin act states, "An employer will be liable for the entire occupational deafness to which his employment has contributed. However, if deafness previous to that which the employment has contributed is established by a hearing test or other competent evidence the

TABLE I.
HEARING DISABILITY TABLE

Average Decibel Loss	% of Compensable Hearing Loss	Average Decibel Loss	% of Compensable Hearing Loss
17	.8	49	53.3
18	2.2	50	55
19	3.6	51	56.7
20	5	52	58.3
21	6.7	53	60
22	8.3	54	61.7
23	10	55	63.3
24	11.7	56	65
25	13.3	57	66.7
26	15	58	68.3
27	16.7	59	70
28	18.3	60	71.7
29	20	61	73.3
30	21.7	62	75
31	23.3	63	76.4
32	25	64	77.8
33	26.7	65	79.2
34	28.3	66	80.6
35	30	67	82
36	31.7	68	83.4
37	33.3	69	84.8
38	35	70	86.2
39	36.7	71	87.6
40	38.3	72	89
41	40	73	90.4
42	41.7	74	91.8
43	43.3	75	93.2
44	45	76	94.6
45	46.7	77	96
46	48.3	78	97.4
47	50	79	98.8
48	51.7	80 and over	100

Method—Add the pure tone air conduction losses in decibels for the three (3) frequencies 500, 1000 and 2000 cps and divide by three (3) to obtain average decibel loss. Find this average in the vertical column on the left (marked average decibel loss) and the percentage of compensable hearing loss for that ear is given directly opposite.

For Binaural Percentage of Hearing Loss use the following formula:
Four times the percentage of lesser loss;
Add the Percentage of greater loss;
Divide total by five.
The resulting percentage is the loss of hearing in both ears and is applied to the schedule allowance for loss of hearing in both ears.

INDUSTRIAL OTOLOGICAL AND AUDIOLOGICAL EXAMINATION

EMPLOYEE _____ AGE _____ OCCUPATION _____

ADDRESS _____ EMPLOYER _____ DATE _____

OCCUPATIONAL HISTORY: (Beginning with last previous, working backward to first job.

	Employer	City	Duties	Duration	Noise Exposure	Ear Protectors
1.						
2.						
3.						
4.						

MILITARY SERVICE: Length _____ Branch _____ Exposure to Gunfire and Noise _____

MEDICAL HISTORY: Allergy _____ Dizziness _____ Earaches _____ Frequent Colds _____

Head Injuries _____ Ringing Ears _____ Running Ears _____ Measles _____ Mumps _____

Meningitis _____ Influenza _____ Scarlet Fever _____ Whooping Cough _____ Tuberculosis _____

Others _____

SERIOUS MEDICAL AILMENTS _____ SURGERY _____

INDUSTRIAL INJURIES OR DISEASE _____

HEARING IMPAIRMENTS IN FAMILY _____

WORKERS EVALUATION OF HEARING STATUS: Good _____ Fair _____ Poor _____ EARS: { Hurt? _____ / Ring? _____

Hearing Is: { Variable _____ / Constant _____ Date of Onset _____ Progression of Loss _____

Has Trouble Hearing _____ In Groups _____ In Auditoria _____ Individuals _____

In Noisy Places _____ At a Distance _____ At Close Range _____ Telephone _____ Because of Ringing in Ears _____

EDUCATION _____ PREVIOUS HEARING TESTS _____ Date Last Worked _____

ADDITIONAL INFORMATION _____

EAR - NOSE - THROAT EXAMINATION

MOUTH _____ TONSILS _____ THROAT _____

NOSE _____ SINUSES _____ NASOPHARYNX _____

EARS (Right) _____ (Left) _____

PURE TONE AUDIOMETRIC FINDINGS

DATE	FR.	250	500	1000	1500	2000	3000	4000	6000	8000		250	500	1000	1500	2000	3000	4000	6000	8000	COMMENTS	BY
	RT. EAR										LT. EAR											

TUNING FORK TESTS

	Right Ear	Left Ear
Weber		
Rinne		
Bone Cond.		

CALIBRATED SPEECH TESTS

Speech Reception Threshold	Discrimination Score
Right Ear _____	Right Ear _____ %
Left Ear _____	Left Ear _____ %

Diagnosis and Recommendations: _____

MEYER S. FOX, M.D.

Fig. 2.

employer shall not be liable for such previous loss." This points out the need for pre-employment pure tone audiometric tests and consultation with otologists in supervising hearing conservation programs.

THIS BRINGS us to the subject of industrial audiometric testing and hearing conservation programs. As an otologist it seems to me that this is the most important phase of this subject and that we must be objective, scientific, practical, and realistic with it. Our primary interest as physicians should be one of hearing conservation.

In order to institute an industrial hearing conservation program it is necessary to educate the people involved. This includes management, and the workers and their representatives. Without complete acceptance on the part of those involved these programs cannot succeed. Therefore, in 1952 and again in 1953 a series of "Noise Control Clinics" were held in various parts of the state of Wisconsin. These were sponsored by such industrial groups as the Wisconsin Council of Safety, the Wisconsin State Board of Health, the Industrial Commission, and the Wisconsin Medical Society. The objectives were to enlighten those in attendance as to the problem, and to also give them "food for thought" to use in their particular plants. Other programs sponsored by the above groups were the Audiometric Testing Workshops, conducted at the University of Wisconsin and at Marquette University. These courses were intended primarily for nurses, and health and safety personnel and others interested in developing the skill and experience necessary to perform hearing tests. These courses have been extremely well attended and will be repeated as indicated. Another important project conducted during the past two summers was the hearing survey at the Wisconsin State Fair. In charge of the investigations was the research team of the Sub-committee of Noise in Industry of the American Academy of Ophthalmology and Otolaryngology.[13] Over 70 workers participated in these studies. Thirty-six hundred visitors to the fair were examined in 1954, and approximately 2000 were examined in 1955. Important contributions have resulted from these studies and will appear in the literature soon.

I should like to emphasize that from a practi-

OTOLOGICAL AND AUDIOLOGICAL EXAMINATION

EMPLOYEE _____ AGE _____ POS. _____ CLK. NO. _____ SHIFT _____

OCCUPATIONAL HISTORY: (Beginning with last previous, working backward to first job.

	Employer	City	Duties	Duration	Noise Exposure	Ear Protectors
1.						
2.						
3.						
4.						

MILITARY SERVICE: Length _____ Branch _____ Exposure to Gunfire and Noise _____

MEDICAL HISTORY: Allergy _____ Dizziness _____ Earaches _____ Frequent Colds _____ Scarlet Fever _____

Influenza _____ Ringing Ears _____ Running Ears _____ Measles _____ Mumps _____ Whooping Cough _____

Others _____

SERIOUS MEDICAL AILMENTS _____ SURGERY _____

INDUSTRIAL INJURIES OR DISEASE _____ Head Injuries _____

HEARING IMPAIRMENTS IN FAMILY _____

WORKER'S EVALUATION OF HEARING STATUS. Good _____ Fair _____ Poor _____

EDUCATION _____ PREVIOUS HEARING TESTS _____ Date Last Worked _____

ADDITIONAL INFORMATION _____

OTOLOGICAL FINDINGS

DATE _____

PURE TONE AUDIOMETRIC FINDINGS

DATE	FR.	250	500	1000	1500	2000	3000	4000	6000	8000		250	500	1000	1500	2000	3000	4000	6000	8000	COMMENTS	BY
	RT. EAR										LT. EAR											

Diagnosis and Recommendations: _____

LCO 854 REV. MEYER S. FOX, M.D.

Fig. 3.

cal standpoint it is extremely important to explain the objectives of the hearing conservation program to the workers. For without understanding and cooperation it will be very difficult for them to accept and use ear protection. Only when they understand that it is for their welfare and that it makes good sense to protect their ears will there be an acceptable attitude toward the use of ear plugs.

THE NEXT phase of the hearing conservation program is the installation of pre-placement audiometric testing programs—*this is a must.* The pre-placement pure tone audiogram is a baseline from which to start. It enables one to follow the employee throughout his entire working period. Were I to express a personal opinion I would state that the one thing that stood out in the claims that have been presented thus far and the one thing that put industry "behind the eight ball," so to speak, is the fact that there were no audiograms available on these workers at the time they began their employment.

The results of preplacement audiograms made during the past two years, reveal the meaning of this statement. It should be pointed out that careful attention should be paid to the testing room and the personnel who are going to do the testing. The testing room should be situated in an area, and should be sufficiently sound-treated, to permit the satisfactory performance of hearing tests. It is desired to have a testing room in an area where the ambient noise level within the room will be below 50 decibels and will cause no masking upon the test itself. This ideal level, however, is not always obtainable. Permissible octave band noise levels[14] for testing rooms have recently been published by Glorig and Cox.

Prefabricated acoustical booths are now available which permit assembling on practically any location, and the performance of satisfactory tests. The personnel who are to do the testing should be sufficiently trained so that they develop skill and interest in this work. It is unnecessary to mention that if a person is disinterested or unfamiliar with what he or she is supposed to do, errors in the results of the audiometric tests will occur.

The preplacement studies which have been made in Wisconsin areas to date have been most enlightening and speak for themselves. No selling job is necessary when one looks at these figures. The reports[15] of the Allis-Chalmers Company show that 27% of new employees reveal a hearing loss at the time of employment. In my own personal studies at the drop forge plant with which I am connected some 40% show a loss at the time of employment. I have often been asked why my studies show higher losses than those of Allis-Chalmers and other companies. This is explained on the basis that people applying at the drop forge plant usually have been exposed to noisy working areas previously.

The audiometric charts used (Figs. 2 and 3) permit the recording of audiograms over a period of years. These are kept in sequence and prevent loss of records as well as bulky files. It should be emphasized that while the audiograms are made by nurses and non-professional personnel, all this work is done under medical supervision, preferably the otologist if available. Those cases which show a significant deviation from normal hearing are referred to the otologist for clinical examination, interpretation, and validation of records. In addition the otologist makes recommendations for job placement where indicated and also regarding the use of ear protectors. The final step in our hearing conservation program consists of noise reduction and control measures. These may be instituted (1) at the source, (2) by substitution procedures, (3) by rotation of personnel, and (4) by the use of proper ear protection.

MY REMARKS have been confined primarily to the problem of occupational hearing loss resulting from noise exposure, and, from a territorial standpoint, to the State of Wisconsin. It is unnecessary for me to point out that the working conditions, noise exposure, and workers involved are also present in the neighboring states of Illinois, Minnesota, Indiana, and Michigan. The difference that exists is in the compensation acts of the various states, and also in the legal interpretations of the same. With time, one can expect uniform changes and conformity in the acts of the various states.[16]

Traumatic hearing losses that occur in industry and in public liability cases, such as automobile accidents, are closely related to this noise problem. There is an increasing recognition of the problems of hearing loss following head trauma resulting from various causes.[17]

Thus it is unnecessary to emphasize the desirability—even the necessity—of having audiograms made on all workers in industry.

Now, may I close on a somewhat optimistic note regarding the hearing loss problem. I feel that if proper hearing testing, noise control measures, and noise reducing methods are introduced in the various industrial areas many of these hearing losses can be prevented and the liability to employers and insurance carriers accordingly reduced. Past experiences in dealing with many of the other industrial hazards justify such an optimistic opinion.

(208 East Wisconsin Avenue.)

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Medical Orphan

IT SEEMS significant that although some ten million accident patients reach physicians' offices annually and thus constitute a sizeable portion of medical practice, it is about the only medical condition in which physicians rarely concern themselves with cause or prevention. It may also be worth noting that as of this late date, the subject of accidents cannot claim a scientific forum it may call its own. Accidents (not the surgical treatment of injuries) are seldom considered an appropriate topic for discussion at scientific medical meetings, are seldom included in the curriculum of medical schools, and are rarely dignified by full-fledged scientific investigations or sizeable grants.

—From "The Accident Syndrome," by MORRIS S. SCHULZINGER, M.D., Charles C. Thomas, Publisher, Springfield, Illinois.

How Much Companies Pay for Medical Services

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MANY SEGMENTS of American business are spending tremendous sums of money to keep their employees healthy and fit.

The magnitude of their investment is indicated in a Conference Board survey showing that 131 companies collectively are paying $15,686,852.85 annually to provide medical and health services for their 885,830 employees. This is a total average annual expenditure of $119,746.97 for a mythical company of 6,762 employees, or an average expenditure of $17.71 per employee. The median annual expenditure for 131 companies is $40,000. And these expenditures are for medical and health services only. They do not include the cost of any company-supported health and accident insurance programs.

The survey also reveals that many of the 131 individual companies have increased their annual total dollar output for these programs in recent years. This increase in total expenditure is due, in some cases, to an increased number of employees on the payroll. In other instances, the increase reflects a higher per-employee expenditure, which in turn is often due to improved company medical services.

The 131 companies providing this cost information represent approximately 54% of 242 companies that were surveyed concerning all aspects of their on-the-job medical services for occupational accidents and illnesses, as well as preventive medical care. (The survey of 242 companies was made for a future report on company medical services for industry, which will appear in the *Studies in Personnel Policy* series.)

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The Cost per Employee

ONE HUNDRED and thirty-five companies provided per-employee cost data for their programs—four more than the 131 firms that furnished total annual expenditures. And since the additional four companies described the cost situation for only one unit of their operations—a home office, for example—and neglected to include the size of the unit, it is impossible to calculate their total expenditures.

The per-employee cost-range in the 135 companies is shown in Table I by size of company, and in Table II by type of industry. As can be seen, by far the largest group of companies (about 53%) pays from $10 to $20 per person, with these companies ranging in size from less than 500 to more than 100,000 employees. And all types of industry are included in these 71 companies that pay $10 to $20 per employee. It is interesting to note, too, that the $17.71 per-employee average cost figure mentioned earlier falls within this $10 to $20 cost range.

The three companies that pay $60 per employee for their medical services have very intensive programs. All offer periodic examinations to their employees. One is an insurance company, one a foundry, and one a utility. Even the smallest of the three (291 employees) has full-time nursing service and a part-time doctor.

Cost Factors

ONLY 125 of the 135 companies explained what factors they include when computing costs.

The cost factors cited and the number of companies that include each factor in figuring the cost of their medical programs are as follows:[1]

[1]Some companies participating in other areas of the survey listed cost factors but no cost figures. Their listings are not included in these data.

TABLE I.
ANNUAL PER-EMPLOYEE COST OF MEDICAL PROGRAMS IN 135 COMPANIES, BY SIZE OF COMPANY

Annual Per Employee Cost	No. of Companies	Number of Employees: 1-499	500-999	1,000-4,999	5,000-9,999	10,000-24,999	25,000-49,999	50,000-99,999	100,000+	Size Not Given
Total Companies	*135*	*10*	*16*	*66*	*20*	*9*	*6*	*2*	*3*	*3*
$1-9.99	30	1	4	14	4	2	2	1	—	2
10-19.99	71	1	7	40	12	5	2	1	3	—
20-29.99	14	3	2	6	1	1	—	—	—	1
30-39.99	9	3	1	3	1	—	1	—	—	—
40-49.99	5	1	1	1	1	—	1	—	—	—
50-59.99	3	—	1	2	—	—	—	—	—	—
60	3	1	—	1	—	1	—	—	—	—

Cost Factors	Number of Companies (125 reporting)
Professional personnel salaries	124
Salaries of nonprofessional staff in medical department	83
Medical supplies and equipment	120
Special examinations for executives	72
Depreciation	44
Rent	45
Heat	50
Light	50
Workmen's compensation (insurance, legal fees, etc.)	3
Other factors	39

The "other factors" mentioned in the tabulation include such items as dues for professional organizations, travel to conventions, the cost of a company ambulance or other cars provided for medical personnel and or patients, taxes, maintenance costs, x-ray service, industrial hygiene programs, pensions of medical personnel, plant safety measures, uniforms, laundry and medical books and magazines.

One reason why costs vary among companies is apparent when their practices in charging the above items are compared. One of the 125 firms providing itemized cost information does not even charge the salaries of its professional personnel to its medical budget—a cost itemized by every other survey participant. About a third of the 125 firms do not list salaries of non-professional personnel in the medical department as a cost factor. In some of these cases, of course, the reason is that smaller companies may have only professional persons in the Medical Department, with a nurse performing whatever clerical duties are required.

A significant cost item not included in five companies' medical programs is the price of medical supplies and equipment.

Almost 58% of the companies include the cost of their special health programs for executives. Others do not include them, and some do not have special programs for executives. In cases where executives are sent to outside sources for their physical examinations, this item may noticeably increase the medical department's expense.

Salaries of Medical Personnel

SINCE the salaries of professional personnel are the most commonly shared cost factor among companies, THE CONFERENCE BOARD attempted to learn what salaries cooperating companies pay such personnel.

Full-time doctors—Eighty-one of the companies reported the salaries of their full-time doctors. As Table III shows, these 81 companies have 123 full-time doctors whose salaries range from less than $6,000 to more than $30,000 annually. Sixty-four of these 123 doctors earn from $10,000 to $15,000. In most cases, the highest salaries are paid to companies' Medical Directors. Salaries of directors alone (a few are part-time directors) are shown in Table IV.

An important feature of the income earned by company-employed doctors in contrast to self-employed physicians and surgeons is the supple-

TABLE II.
ANNUAL PER-EMPLOYEE COST OF MEDICAL PROGRAMS IN 135 COMPANIES, BY INDUSTRY

Industry	No. of Companies	Annual Per-Employee Cost $1-9.99	$10-19.99	$20-29.99	$30-39.99	$40-49.99	$50-59.99	$60-69.99
Total Companies	*135*	*39*	*71*	*14*	*9*	*5*	*3*	*3*
Food and allied products	9	3	3	3	—	—	—	—
Textiles	3	2	1	—	—	—	—	—
Paper and allied products	8	1	5	—	2	—	—	—
Rubber	4	1	3	—	—	—	—	—
Electrical	5	1	3	—	—	—	1	—
Petroleum	4	—	1	1	—	1	1	—
Aircraft and auto products	5	1	4	—	—	—	—	—
Iron, steel, metal castings	5	—	2	2	—	—	—	1
Chemical and pharmaceutical	10	1	4	1	2	2	—	—
Machinery—all kinds	5	—	3	2	—	—	—	—
Merchandising	7	4	2	—	—	1	—	—
Communications	7	3	2	2	—	—	—	—
Transportation	5	1	4	—	—	—	—	—
Utilities	10	3	5	—	—	—	1	1
Financial	11	3	5	1	1	—	—	1
Miscellaneous[1]	37	6	24	2	4	1	—	—

[1] Miscellaneous includes those industries with two or less representatives. Among them are glass, sporting goods, small tool, printing, lithographing, air conditioning, twine, tape, explosives, etc.

TABLE III.
SALARIES OF 123 COMPANY DOCTORS[1] IN 81 COMPANIES,[2] BY SIZE OF COMPANY

Salary Range	No. of Companies	Number of Employees 1-499	500-999	1,000-4,999	5,000-9,999	10,000-49,999	50,000-99,999	100,000+	Not Given
Total Companies	*123*	*2*	*5*	*47*	*23*	*36*	*2*	*3*	*5*
Under $5,999	5	—	—	3	1	1	—	—	—
$6,000-9,999	8	1	—	4	—	3	—	—	—
10,000-14,999	64	1	3	29	9	15	1	2	4
15,000-19,999	28	—	1	10	10	7	—	—	—
20,000-24,999	12	—	1	—	2	7	1	1	—
25,000-29,999	5	—	—	1	1	2	—	—	1
30,000 or more	1	—	—	—	—	1	—	—	—

[1] The 123 doctors include 63 who are also Medical Directors.
[2] Thirty-five companies gave salaries for two or more doctors.

TABLE IV.
SALARIES OF 63 MEDICAL DIRECTORS,[1] BY SIZE OF COMPANY

Salary Range	No. of Medical Directors	500-999	1,000-4,999	5,000-9,999	10,000-49,999	50,000-99,999	100,000+	Not Given
Total Medical Directors	*63*	*3*	*26*	*11*	*18*	*1*	*1*	*3*
$6,000-9,999	3	—	3	—	—	—	—	—
10,000-14,999	23	1	15	1	4	—	—	2
15,000-19,999	20	1	7	8	4	—	—	—
20,000-24,999	11	1	—	1	7	1	1	—
25,000-29,999	5	—	1	1	2	—	—	1
30,000 or more[2]	1	—	—	—	1	—	—	—

[1] Sixty-one companies have supplied data on salaries paid their Medical Directors, but one company gave salaries for three directors in different plants, bringing the total to 63 directors.

[2] Only one company reported that the salary range of its Medical Director is above $30,000. However, some corporations reported paying more than $15,000 for staff doctors but did not provide information about the salaries of their Medical Directors. It is possible that some of the latter, as well as directors of some large corporations that did not furnish any salary information, are in the $30,000 or more category.

menting of salary by executive bonuses, profit-sharing plans, pensions and other fringe benefits that are common in business firms.

Part-time doctors—Some firms with full-time doctors also pay for the services of part-time doctors. And, of course, many companies have only part-time doctors. This part-time fee is paid in several ways. It may be on an hourly basis, or on a per-visit basis, or it may be a salary contract or retainer fee, or a retainer fee plus an hourly rate. One cooperator explained that its part-time doctor's salary is determined by using the full-time doctor's salary as a base, and then scaling this base downward in terms of the percentage of time actually worked.

Only 24 companies stated what hourly fee they pay their part-time doctors. As Table V shows, the range is wide—from $3 to $20 per hour. It is probable, though not usually explained by cooperators, that the high part-time fees are for surgical service in compensation cases and for specialists called for consultation purposes.

An analysis of the geographical location and size of the companies offers no clue as to reasons for the variation in fees. Among localities represented in the $10-an-hour group are Milwaukee, Atlanta, and Chicago, as well as two small New Jersey towns near metropolitan centers, a small city in Connecticut, and a small town in Michigan. The companies range in size from 310 to 15,000 employees.

The company paying a $20 fee is near Boston and the one paying $15 is in Minneapolis. The fees in the lower brackets are paid in cities as large as Philadelphia and in small midwestern towns.

Nurses—Salaries of 413 nurses employed by 210 companies are grouped by size of company as well as salary range in Table VI. The overwhelming majority of the 413 nurses receive from $3,000 to $5,000 annually, with the greatest proportion of that group earning from $4,000 to $5,000. Eighty-seven of the nurses have the title of "chief nurse," and these chief nurses are represented in various salary range groups. About 64% of the 53 nurses who are earning more than $5,000 are chief nurses.

Medical technicians—Twenty-nine companies supplied information about salaries for medical technicians. As with the nurses, the greatest number receive $3,000 to $5,000, as can be seen in Table VII.

TABLE V.
HOURLY FEES PAID BY 24 COMPANIES FOR PART-TIME DOCTORS

Hourly Fee	Number of Companies
$3, $5 and $7.50[a]	1
3.50	1
5.50	1
6	3
6 to $12	1
6.05[b]	1
6.50	1
6.50 to $10[a]	1
7	1
7.50	1
7.50 to $10[a]	1
8	1
10	8
15	1
20	1
Total	24

[a] Fees differ for various reasons: (1) company has several part-time doctors and pays them different rates; (2) fee varies according to the total amount of time spent at the company during one visit; (3) fee varies according to the type of medical work required.

[b] The top rate paid is $6.05 but not all part-time doctors get the top rate.

TABLE VI.
SALARIES OF 413 NURSES IN 210 COMPANIES,[1] BY SIZE OF COMPANY

Salary Range	No. of Nurses	Number of Employees: 250-499	500-999	1,000-4,999	5,000-9,999	10,000-49,999	50,000-99,999	100,000+	Not Given
Total Number of Nurses	*413*[a]	*14*	*25*	*164*	*48*	*122*	*23*	*5*	*12*
$2,000-2,999	2	—	1	—	—	1	—	—	—
3,000-3,999	162[b]	7	13	66	16	33	20	1	6
4,000-4,999	196[c]	7	7	76	22	75	1	2	6
5,000-5,999	46[d]	—	4	21	8	9	2	2	—
6,000-6,999	7[e]	—	—	1	2	4	—	—	—

[1] Some companies with more than one nurse gave salary ranges for all nurses on their payrolls so the total number of nurses is greater than the total number of companies.

[a] Eighty-seven have the title of "chief nurse."

[b] Six are chief nurses.

[c] Forty-seven are chief nurses.

[d] Thirty are chief nurses.

[e] Four are chief nurses.

TABLE VII.
SALARIES OF MEDICAL TECHNICIANS IN 29 COMPANIES, BY SIZE OF COMPANY

Salary Range	No. of Companies	Number of Employees 1-999	1,000-4,999	5,000-9,999	10,000-49,999	100,000+
Total Companies	*29*	*2*	*3*	*8*	*9*	*1*
$2,000-2,999	1	—	—	—	1	—
3,000-3,999	10	1	2	3	3	1
4,000-4,999	11	1	3	3	4	—
5,000-5,999	5	—	3	1	1	—
6,000-6,999	2	—	1	1	—	—

Cost Comparisons

THE question arises:—How do the cost data of the present survey compare with those of earlier years? Are companies now paying more or less for their employee health services?

Thirty-five of the cooperators provided both 1945 and current per-employee data. Thirty of the 35 firms also furnished their total annual expenditures for these periods. Both types of information are shown in Table VIII. Also shown are sums representing the conversion of companies' present dollar expenditures to 1945 dollars. This, obviously, allows for a better comparison of current costs with those in the earlier period before inflation had reduced the buying power of the dollar.

Cost figures for comparative purposes can be deceptive, however, whether the purpose is to compare one company's costs with another or to compare a single company's expenditures in different years. To interpret cost data reliably, it is important to know the elements that have been considered in determining them and to recognize the variables that can change their interpretation. For example:

1. Companies vary in methods of cost allocation. As shown in the tabulation on cost factors, one firm may charge its Medical Department with heat, rent and light, while another does not. Similarly, some companies charge the employee medical program with the cost of special examinations for executives performed at outside clinics; others do not. And this variation exists in all cost factors.

2. Nothing in a cost figure indicates how extensive a company's program is. Company A, for example, may provide periodic physical examinations to all employees, but Companies B and C may not.

3. The size of the company affects the cost. Per-employee costs, of course, are lowered as a company's size increases because the cost of operating a Medical Department is spread over a wider group of employees. Accordingly, a company of 2,000 employees with the same type of program as a company of 4,000 may pay more per employee for its program even though the two charge the medical service with similar cost factors.

4. Any single year's figures for a company can be deceptive because they may reflect unusual ex-

TABLE VIII.
CURRENT AND PAST COSTS OF COMPANIES' MEDICAL SERVICES

Company	Current Per-Employee Cost	Current Per-Employee Cost at 1945 Prices[1]	Per-Employee Cost in 1945	Current Total Annual Cost	Current Total Annual Cost at 1945 Prices[1]	Total Annual Cost in 1945
A	$16	$11.20	$19.94	$ 81,000	$ 56,691.90	$ 40,000
B	42	29.40	22			
C	9	6.30	5.05	10,350	7,243.97	4,600
D	18.04	12.63	10.67	131,310	91,903.87	96,830
E	16	11.20	10	42,000	29,395.80	26,000
F	6	4.20	1.40	10,000	6,999	900
G	15.50	10.85	16.60	93,000	65,090.70	92,000
H	6.50	4.55	5	250,000	174,975	135,000
I	17	11.90	8.80	80,756	56,521.12	26,993
J	8.18	5.73	5.84			
K	19.20	13.44	11.90	35,000	24,496.50	19,000
L	15.18	10.62	11.43	52,185	36,524.28	26,303
M	6.62	4.63	7.46	8,600	6,019.14	8,650
N	11.25	7.87	10.97	93,769	65,628.92	143,706
O	14.09	9.86	9.10	4,508.65	3,155.60	3,012.20
P	15.92	11.14	5.05	122,652	85,844.13	29,689
Q	15.45	10.81	12.30	16,360	11,450.36	7,455
R	9.30	6.51	3.90	16,000	11,198.40	6,400
S	15	10.50	6	18,000	12,598.20	15,000
T	10	7	7.50	8,091	5,662.89	6,000
U	35.63	24.94	8.37	89,000	62,291.10	22,000
V	15.37	10.76	6.21			
W	18.10	12.67	16	400,000	279,960	379,000
X	16.64	11.65	25.92	101,504	71,042.65	111,127
Y	11.75	8.22	6.95			
Z	3.44	2.41	1.50	16,326.24	11,426.74	4,365
AA	18.11	12.68	11.55	122,000	85,387.80	46,205
BB	26.50	18.55	13.50	7,000	4,899.30	4,000
CC	26.04	18.23	9.35			
DD	6.67	4.67	3.95	173,000	121,082.70	78,000
EE	44	30.80	18.46	200,000	139,980	42,000
FF	17	11.90	6	140,000	97,986	62,000
GG	14.16	9.91	7.40	28,535	19,971.65	15,442
HH	11.25	7.87	7.85	11,900	8,328.81	7,300
II	6	4.20	3.50	40,000	27,996	15,700

[1] These figures are based on the NICB consumer price index.

pansion of the Medical Department or unusual purchases of equipment and supplies.

5. The type of business may influence the cost of medical services. Hazardous industries are apt to have more extensive medical services than banks and department stores for example. And most pharmaceutical firms, because of the nature of their products and their interest in promoting medical care, have more comprehensive programs than many other companies. Insurance firms, too, with their interest in maintaining health and preventing accidents, are inclined to have better health services than many other white collar firms of similar size.

Even when an individual company attempts to compare its own costs from one year to the next, there are difficulties such as:

Differences in the value of the dollar due to inflation or deflation.

Changes in an individual company's method of allocating costs. (An item charged against the medical program now may not have been included in earlier years, or vice versa.)

Significant increases or decreases in the size of the individual company that may have lowered or raised its per-employee cost.

Higher costs in one year because of expansion of facilities, purchase of quantity lots of equipment, etc. (This is especially important where companies' costs for earlier years appear much higher. It was during the 1940's that many firms expanded their programs.)

Any influence that the first factor--the change in the dollar value—may have in this cost comparison picture can be determined by figuring the amounts spent in the two periods in terms of a constant dollar. And since most of the companies that provided per-employee cost information for past years also gave their total annual expenditures, in some cases it is also possible to determine whether a company's size has contributed to its per-capita cost change. The second and fourth factors, therefore, are the only ones that remain entirely unknown in this survey.

A comparison of 35 companies' present annual per-employee costs with similar 1945 costs (columns 2 and 4 in Table VIII) shows that all but four companies are now paying more. Thirty of these 35 companies also provided comparative total annual expenditure data, and 27 of the 30 are paying increased total annual expenditures.

In Terms of a Constant Dollar

BUT how do the expenditures line up in terms of the 1945 dollar? How many of the companies that are now paying more per employee, and also more per year still fall in this category when these expenditures are computed on the basis of a 1945 dollar?

Even when this is done, the comparison shows that 24 of the companies now pay more per employee. Four of the remaining 11 that are paying less show such slight decreases (45 cents, 11 cents, 81 cents and 50 cents) that even small bookkeeping changes or fluctuations in employment figures could account for the differences. In total expenditures, 23 of the 30 companies providing data show increases, while the remaining seven show decreases. And some of these seven companies have increased in size so that the total expenditure decrease may be attributable to the greater number of employees. But without more information, of course, this interpretation can be only speculative. However, Company A, which is now paying a smaller per-employee cost both in current dollars and on the basis of the 1945 dollar, has more than 3,000 additional employees. And total annual expenditures for Company A have greatly increased, both in current and 1945 dollars. Therefore, its lower per-employee cost can logically be said to reflect increased size rather than any great reduction in medical services offered.

Similarly, Company H is paying less per employee in terms of the 1945 dollar and only $1.50 more in current dollars. But the company has experienced a tremendous increase in employment (more than 11,000 employees) so that its medical overhead costs are spread over a wider range and the per-employee cost accordingly becomes less. Examination of the total expenditures bears this out, since both in current dollars as well as in 1945 dollars the total annual expenditure is considerably greater than it was in 1945.

Another example is that of Company L. Its present per-employee expenditure, when converted to 1945 dollars, is less than the actual 1945 expenditure. But the company now has more than 1,000 additional employees. And its total present expenditure is higher both in current dollars and converted dollars. Its decreased per-employee cost, therefore, may very well reflect the increase in the number of employees.

Conversely, of course, increased per-employee cost can be the result of fewer employees. However, in the Board's survey, cases of this type are more questionable because only a small minority of companies have decreased in size. Company FF is an example of one of the few with a sizable decrease—approximately 2,000 fewer employees. Yet the company has increased its total expenditure for medical services to such a great extent that improvement in the service is obviously one important reason for the increased per-employee cost.

The Trend Is Up

IT IS WORTH repeating that in all of these cost figures, factors such as changes in accounting methods, unusual Medical Department expansions occurring in one period, inaccuracy of the data reported by the Medical Department, etc., may have an effect on an individual company's figures.

But regardless of the influence of these factors, the number of companies showing the same or increased expenditures for medical services is enough of a majority to indicate that medical and health programs for employees have progressed rather than regressed in the past 10 years.

Further indication of this trend is found in the case of one company whose cost figures suggest decreased medical services when actually the ex-

planation is quite different. Company N's per-employee and total expenditures have decreased since 1945. Even considering a 5,000 drop in the number of employees, the company is not paying as much now, comparatively, for its medical services as it did in 1945. But the company explains this situation as follows:

"In 1945 our 5,000 additional employees were located in buildings and areas remote from our present main operating facilities. At the time, for example, we operated one plant some five miles distant from our main plant. To equip and staff these buildings with medical facilities, additional expenditures in personnel, equipment and supplies were necessary. These remote areas are not operating today."

And to give further assurance that its medical service has suffered no decline, the company adds: "We believe our medical services today to be superior to those offered in 1945. Yet at the same time fewer medical personnel are needed to provide these services. Improved training, improved techniques and better operating controls have been integrated with a streamlining of various routine procedures to bring this about."

Finally, take the case of Company X. Although its cost figures actually do reflect a reduction in medical services due to a smaller staff and other general economies, the company says: "We are attempting now to engage an additional full-time physician because we believe there is no question but that we are understaffed at this time."

Industry Needs Physicians

OCCUPATIONAL medicine is that branch of medicine which deals with the relationship of man to his occupation, for the purpose of the prevention of disease and injury and the promotion of optimal health, productivity and social adjustment." This definition was agreed on at the Conference on the Education of Physicians for Industry in Pittsburgh in December. A growing interest in this subject, springing from a growing need, has been evident in the past 30 years. Industry is accepting on an everwidening scale the concept that the health of the worker is a basic asset and that it is closely related to efficiency. Health has to do with optimal adjustment of the total person to his total environment. Many persons with no major anatomic or physiological defects function below their optimal level because of a failure to make such an adjustment, while others who have adjusted successfully carry on and accomplish important tasks apparently oblivious of defects that could legally be classified as disabling. The need for preventive medicine in industry has been increased through the trend toward group insurance programs supported in part by the employer and covering non-occupational illnesses. The growing need for physicians trained in preventive medicine and administration presents the medical profession with a challenge that it must meet or see the leadership in this field fall into the hands of lay persons. When a pressing need becomes evident, it must be met in some way. Those with foresight will do all in their power to see that it is met in the best way possible. In this instance medical leadership is definitely called for. A start must be made in the medical schools. Already these schools are being aided financially by large industries. It is only reasonable, therefore, that these industries should expect some recognition by the medical schools of the medical problems peculiar to them. The industrial physician, far from competing with the private practitioner, is a valuable source of referral, and through mutual cooperation, a better solution of the health problems of the worker can be made. One of the chief functions of the industrial physician is to determine the employee's physical fitness for a proposed job. He must also apply the principles of environmental sanitation to his plant and advise management in all matters pertaining to the health of the workers. The physician in private practice is often called on to fill out insurance forms or to act as part-time physician for smaller companies unable to afford a full-time physician. Such a doctor often complains of the tiresome paper work involved, but he should realize that this is an indication of a greater concern of employer for worker, which is in itself a good thing, and that this interest is a bulwark against state medicine. —Editorial, *Journal of the American Medical Association*, 160:16, 1411 (April 21) 1956.

Medical and Surgical Treatment of Cirrhosis of the Liver

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IT IS UNWISE to be dogmatic about this subject, chiefly because its etiology is not clearly defined and present-day empiricism leaves much to be desired. Railway surgeons as a rule are practical men and there is not time for academic discussions. Therefore, in railroad parlance, I shall do my best to turn the green light on a roadbed which may guide you through the uncertain territory of conflicting opinion, into what might be termed the shelter of a relatively safe although as yet incomplete union station of medical and surgical thought concerning the treatment of post-necrotic cirrhosis of the liver.

Pathology

CIRRHOSIS is a generic term describing the liver's appearance and may be applied to several pathological varieties. These may be outlined as follows:

1. Post-necrotic cirrhosis (atrophic, portal or Laennec's cirrhosis):
   - (a) Toxic or infectious.
   - (b) Hemochromatosis.
   - (c) Banti's syndrome.
   - (d) Syphilitic cirrhosis (Hepar Lobatum).
   - (e) Sarcoidosis.
2. Fatty cirrhosis which may be a forerunner of certain varieties of post-necrotic cirrhosis. However, as generally observed the amount and density of the fibrous tissue and fibrous proliferation are less than in post-necrotic.
3. Obstructive biliary cirrhosis.
4. Capsular or psuedo-cirrhosis which is usually associated with polyserositis the result of constrictive pericarditis, or advanced portal cirrhosis with ascites.
5. Central, cardiac, or hyperemic cirrhosis.
6. Hypertrophic biliary cirrhosis.
7. Traumatic cirrhosis.

I shall confine my discussion to the group of cirrhoses known as post-necrotic. Whatever the cause or causes of the necrosis of hepatic cells, the pathologic changes follow a similar pattern. Hepatotoxins or infections cause necrosis of hepatic parenchyma. This is followed by granulation tissue and fibrosis, resulting in a scar which contracts causing ischemia. This curtailment of blood supply causes more necrosis and thereby more fibrosis, which again, is followed by a greater degree of ischemia.

Once the cicatrizing process gets under way the soft elastic liver with its dual blood supply and its capacious adjustable circulation is converted into a small hard, inelastic organ filled with bewildered blood vessels, unable to adjust to different volumes of blood and seeking to by-pass lobules, lobes and the liver itself with an intricate network of veno-venous and arteriovenous shunts.

Vascular impedence is reflected in an increase in the hydrostatic pressure throughout the portal system which is literally converted from a hepatopetal to an hepatofugal flow especially around the esophagus. Venovenous and arteriovenous shunts increase within the liver producing an angiomatous transformation. The spleen enlarges to take over the reservoir function of the crippled liver. Communications between the hepatic arterial inflow and the portal venous inflow are more intimate, and the higher arterial pressure competes with, and is reflected in, portal venous pressure. Since approximately 94% of the blood volume is in rapid transit at all times, and only 6% is left for the capillaries, the sluggish splanchnic bed with its parasitic circulation encourages and in fact demands a greater total circulating blood volume. In this sense, then, the entire splanchnic bed becomes a parasitic type of circulation.

If this progressive morbid change continues, the ultimate result is an hepatic insufficiency with its ominous prognosis, manifested clinically by: a greater shrinkage in the size of the liver with bleeding esophageal varices; vomiting and diarrhea or both; ascites; somnolence and lethargy; generalized edema which is uncontrolled; and persistent jaundice.

Prevention of Post-Necrotic Cirrhosis

GOOD TREATMENT begins with prevention. Since we do not understand all of the causes of the disease we can only launch our attack on those that are known. Hepatotoxic drugs such as thorazine, achromycin, alcohol, arsenic, and carbontetrachloride should be used with caution because what seems to be a transient jaundice may set into motion those factors which ultimately lead to cirrhosis. I am not sure that such drugs as the short-acting barbiturates, morphine, methadone, meperidine-hydrochloride (demerol) and tetraethylthiuram disulfide (antibuse) are not equal-

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ly dangerous if used over a long period of time. Alcohol used to the exclusion of an adequate well-balanced diet, incites changes within the liver which lead to necrosis of hepatic cells. The disease can be reproduced in the experimental animal and may be protected by drugs and certain amino acids which we shall discuss presently. It would seem that the liver asks only for a recovery period between insults, and in the individual who is susceptible this must be carefully considered. I refer of course to those individuals who have had some form of liver damage.

Prevention of viral hepatitis or a closely allied disease which has been referred to as cholangiolitic cirrhosis is a public health problem, requiring strict isolation for those afflicted, as well as a problem to all of us who employ blood transfusions. It is difficult to distinguish clinically between the "A" virus known as infectious hepatitis and the "B" virus which is known as serum hepatitis, and perhaps the only clue to the causative agent is in the history of an individual who has received blood or serum or plasma and an incubation period which is within the limits of expectation. Other than this it may be impossible to delineate the two types. This constitutes not only a public health hazard but also a problem for physicians engaged in caring for employees with sick benefits. It is impossible at times, to state that a given case of hepatitis was acquired by the blood transfusion which the patient received or by exposure. What is more discouraging is that homologous serum jaundice is not as yet entirely preventable. There is no sure way of determining whether an individual donor has had contact with a viral hepatitis or is afflicted with the disease at the time the blood is taken. The viral types of hepatitis may be ultimately controlled by vaccine, but at present none is available. Careful selection of donors and strict supervision of personnel handling blood may diminish the B type of viral hepatitis. Also isolation of those afflicted with infectious hepatitis or the A viral types may prevent the dissemination of this disease. The dangers of the disease lie not so much in the immediate mortality but in the chain of events which may ultimately lead to the post-necrotic varieties of cirrhosis.

It would seem that in America the so-called dietary types of cirrhosis of the liver would be impossible. We know that they exist in certain provinces of China and elsewhere, and that such areas harbor a high incidence of portal cirrhosis due, perhaps, to starvation diets or avitaminosis. Indeed, we have received correspondence from many parts of the world, particularly in and around Hong Kong, where such types of cirrhosis are common. In America it seems to be limited to the alcoholic who prefers his alcohol to a well-balanced diet, particularly rich in proteins and carbohydrates. Such individuals have no appetite for any kind of food, and when they do eat it is particularly deficient in vitamins and proteins.

The prevention of a scarred liver may be hoped for in other conditions; one of these is traumatic

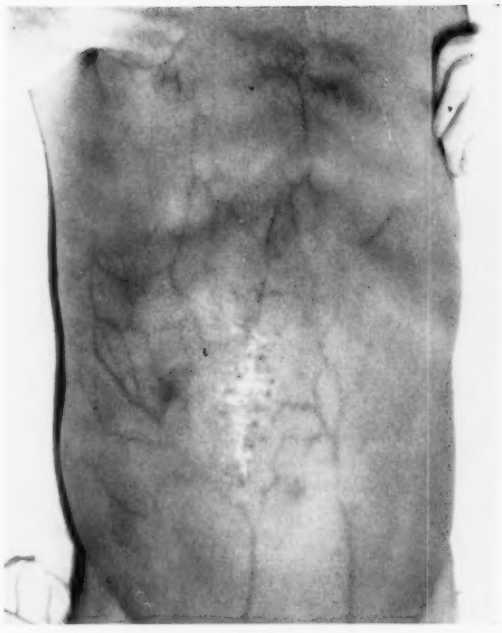

Fig. 1.
Traumatic Cirrhosis. Infrared photo of abdomen nine months after liver injury and surgical repair. Note distention due to ascites and prominent venous collaterals on the abdominal wall (caput medusae).

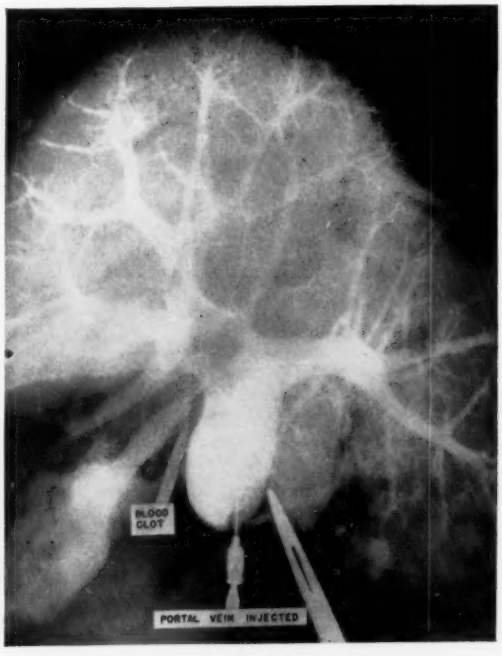

Fig. 2.
Traumatic Cirrhosis. X-ray photo of liver after injection of 70% diodrast into the portal vein. The hepatic artery has been clamped with a hemostat. There is no apparent blunting, distortion or occlusion of any portion of the portal vein. However, there is some dilatation around the blood clot.

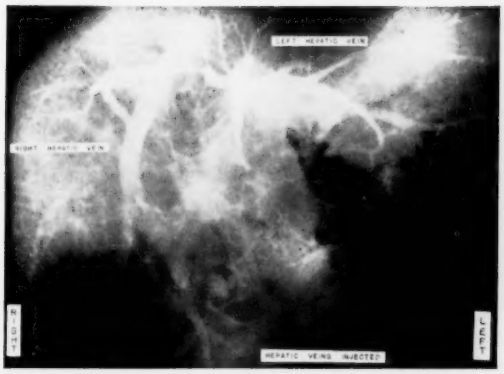

Fig. 3.
Traumatic Cirrhosis. X-ray photo of liver after injection of 70% diodrast into the hepatic veins. In the center of the photograph the area of scarring may be seen. Note the absence of hepatic venous radicles in and around the entire zone of scarring.

Fig. 4.
Traumatic Cirrhosis. The liver has been sectioned through the right lobe to demonstrate the area of cicatricial contracture.

injuries to the liver. This, to our knowledge, has not been previously alluded to in most discussions on the subject. However, we did report one case[1] which we considered typical of post-necrotic cirrhosis of the liver and two other cases which would fit into this category. Our patient was one with traumatic lacerations of the liver which are clearly shown in the accompanying illustrations (Figs. 1, 2, 3, 4). The pathological and clinical changes which followed this injury were not unlike typical post-necrotic or Laennec's cirrhosis and ultimately caused the demise of the patient owing to bleeding esophageal varices and uncontrolled ascites and jaundice. Here prevention would consist of careful suture techniques with control of infection by antibiotics, thereby decreasing the large area of necrosis and hence fibrosis.

Protazoan infections such as syphilis, trypanosomiasis, malaria, leshmaniasis (kala azar) and the digenetic trematodes diseases (schistosomiasis) may now be treated successfully by newer antibiotics and drugs. The possibility of such diseases must be kept in mind particularly in areas where these infections are endemic and in patients who have resided in such districts.

Hypothetical toxins said to be present in extensive burns and in toxemias of pregnancy including acute yellow atrophy are now treated with the full knowledge that, whatever the agents of the so-called toxemia, they are likely to be hepatotoxic and therefore the liver should be spared as much as possible and drugs known to have an affinity for liver cells should be used cautiously.

The cause of Banti's syndrome is unknown. Cruveilhier-Baumgarten syndrome is due to a persistence of patency in the umbilical vein thereby producing in effect arterio and venovenous fistulae between the umbilical vein and the portal vein and through the ductus venosis (Arantii) if patent with one or more hepatic veins and the vena cava.

Prevention of post-necrotic cirrhosis begins with the earliest recognition of any disease or malformation which might cause necrosis of liver cells. Then the liver must be spared by curtailing its work or burden as much as possible.

Treatment of Atrophic Cirrhosis of the Liver

A RATIONAL approach to the treatment of cirrhosis is to consider the functions of the liver.

In general the liver has six basic functions, and in cirrhosis any or all of these may be seriously curtailed. Protein metabolism is guarded by the liver to the last and when serum albumin is very low and the prothrombin time has reached dangerous limits we know that liver function is seriously impaired. Normally some amino-acids are required intact for building body proteins; others are broken up and the incombustible amino group is split from the amino-acid molecule producing ammonia, which is combined with carbon dioxide to form urea. This is excreted in the urine. Many, but not all of the remaining amino-acids may undergo oxidation for energy or be transformed into glucose. Glucose may be burned or stored as glycogen or then transformed into fat. Still other proteins are snythesized into usable serum proteins. The crippled liver cannot fully snythesize deaminate or store protein or glycogen. Since not all proteins form glycogen it is necessary to supply adequate amounts of glucose as well as simple carbohydrates. The amount of protein to be given and the kind of proteins are debatable. Certainly proteins are necessary. However, in the presence of a badly injured liver deamination is poor and the lethargy, somnolence, and stupor are all clinical evidence of liver failure. Proteins in all forms should be given prophylactically in the absence of such symptoms. However, with evidence of beginning hepatic inadequacy it is perhaps wiser to use plasma proteins and glucose parenterally. Antibiotics such as penicillin, streptomycin and neomycin as well as sulfathaladine may help because they inhibit bacteria in the liver and in the intestine and slow up the absorption of ammonia.

Carbohydrates are stored as glycogen in the

normal liver. In cirrhosis the ingestion of a large quantity of simple carbohydrate is necessary so that a source of glycogen for this organ will be continuously available.

Fat metabolism is impaired. Liver fat comes from the ingestion of fat, mobilization from fat depots, and synthesis of fat by the liver from carbohydrate and protein. Normally only 2% to 4% of the liver weight is due to fat. When excessive amounts of cholesterol or alcohol are ingested, or a deficiency in choline or in vitamin B Complex or B_{12} is present, the liver stores fat, thereby rendering itself more susceptible to the effects of hepatotoxins. These large fatty livers may then undergo necrosis with some fibrosis or the necrotizing process may continue with the small shrunken atrophic liver as an end result.

Detoxification of toxins and bacteria is impaired in cirrhosis and therefore the cirrhotic should be protected from the infectious diseases. Antibiotics and adequate rest usually create an environment unfavorable for unbridled bacterial growth.

Clotting time is prolonged because fibrinogen and prothrombin are not produced in adequate amounts. Therefore, vitamin K, blood transfusions, fibrinogen, and vitamin B complex and B_{12} are given in adequate amounts.

The production of bile is impaired. Bile that is produced is not readily secreted into bile canaliculi. Jaundice which is a frequent manifestation in atrophic cirrhosis may be due to extensive hepato-cellular damage or to inflammation, edema, or degeneration of duct epithelium.

Measures designed to prevent cirrhosis and to combat complications must be instituted early in the disease and continued until function is restored. The patient should be put under strict dietary control. This includes a high protein, high carbohydrate, and low fat diet. Since the cirrhotic is unable to excrete sodium this cation should be restricted, and in addition cation-anion resins may be given a trial because they aid in the removal of sodium through the gastro-intestinal tract. This is important, particularly, in the presence of edema or ascites because the kidney tubules are notoriously reluctant to eliminate sodium causing hypernatremia and with it a retention of water. This situation was formerly referred to as cirrhotic nephrosis and its explanation is still not entirely clear. Recently our experience with resins has not been very happy, owing to the fact that they are gastro-intestinal irritants causing enterocolitis with gastritis and bleeding. Moreover, other cations are lost when resins are given, such as potassium and calcium which normally are retained in cirrhosis. Potassium and calcium must be given to avert hypokalemia and hypocalcemia when resins are used. Perhaps a careful control of sodium intake is preferable to the use of resins.

Those amino-acids and vitamins which are known to prevent the various types of post-necrotic cirrhosis in the experimental animal are given in large amounts. These consist of choline, cystine, methianine, B complex, vitamins E, C, and K. In the presence of edema and ascites the mercurial diuretics such as mercurophylline (Mercuzanthin) and meralluride (Mercuhydrin) and mercaptomerin (Thiomerin) are useful. The anemia which is usually present is treated by various iron preparations, folic acid, and vitamin B_{12}.

Fibroblastic Inhibitors

THE REGIMEN which we have outlined may be supplemented with certain other drugs which are newer and which have potentialities. I refer to the fibroblastic inhibitors. If the disease is progressive and degenerative then anything that might delimit the ensuing fibroplasia or at least control it would be welcome. Fibrinolysins which are present in serum are the activators that permit the production of inflammation. Antifibrinolysin inhibits inflammation. Without commenting on this in any more detail, I should like to mention some of the drugs that have been proposed to control the inflammatory and therefore the fibroblastic response. Among these are the adrenocorticotropic hormone (ACTH), Cortisone and Hydrocortone. Injury elicits an inflammatory response and a stimulus to the pituitary which is transmitted through the central nervous system or through metabolites. This stimulation causes a release of ACTH which acts upon the adrenal cortex and in turn produces compound F or Cortisone. Cortisone inactivates fibrinolysin and this inhibits inflammation. Clinically it is true that Cortisone and its closely allied drugs do produce a temporary improvement in the patient's condition. However, some of the bad effects of this drug have now become manifest and in general I think it has no place in the treatment of cirrhosis.

Also in inflammation thyrotropic hormone is released and causes fibrinolysin inactivation to take place more slowly, causing an increase in the inflammatory reaction. To combat the effects of thyrotropic hormone, thyroid extract has been proposed. We have had no experience with this drug.

Antihistamine drugs are fibroblastic inhibitors. Our experiments[2] indicate that the antihistamines curtail the formation of excessive scar tissue and therefore we give our patients histadyl daily. It will, of course, take some time before the effects of antihistamines can be accurately evaluated.

Special Complications

THERE ARE two complications which demand special consideration. These are bleeding from esophageal varices, and persistent ascites.

Bleeding from esophageal varices: The treatment for this complication depends upon two fundamental dictums:

1. Arrest hemorrhage and replace blood.
2. Prevent recurrence of hemorrhage, if possible.

Arrest of Hemorrhage

BLEEDING may be controlled by direct and indirect measures. The former include vitamin

K in large amounts, the use of coagulants such as protamine sulfate, and blood transfusion. Direct control may be obtained through tamponade with the Patton-Johnston or the Sengstaken-Blakemore tubes. The only direct operative attack on the bleeding varices during the active phase of bleeding is transesophageal plication and this measure is of temporary value only. The patient is placed in the semi-sitting or reversed Trendelenburg position. This indirectly favors adequate pulmonary ventilation and cardiac function and clears a pathway for the enlarged veins of esophageal plexus to empty into the vena cava, the azygos, and the left suprarenal veins. In addition, there is a lowering of portal pressure in the upper abdomen and a pooling of systemic venous blood in the lower extremities. This also facilitates venous flow from varices to azygos and caval tributaries.

Prevention of Recurrent Hemorrhage

PREVENTION of recurrent hemorrhage is a serious problem because one hemorrhage is usually followed by another and most of these patients will be dead within two years if the progress of the disease is not arrested. There is perhaps no sure way of preventing recurrent episodes of bleeding from esophageal varices. The following is a summary of methods currently employed:

1. Resection of the variceal area, namely, the lower esophagus and cardia with esophagogastric anastomosis. We have done this procedure often enough to know that the results are entirely unpredictable.

2. Total gastrectomy in an effort to relieve the esophagus of the erosive factor of gastric juice. This is an extensive procedure and its results are equivocal.

3. Transesophageal ligation of varices. This has been said to give good permanent results in extrahepatic portal obstruction. It has been ineffective in permanently arresting hemorrhage from esophageal varices in atrophic cirrhosis.

4. Venovenous shunts, namely, splenorenal, portacaval and others between the portal and systemic venous systems are favored by most observers today. However, in accepting patients for this type of surgery the serum albumin should be about 3 gm. and the liver profile must be better than the average cirrhotic we see. Ascites is rarely improved but bleeding is ameliorated in a large percentage of patients. Therefore, in the patient who will tolerate the procedure, venous shunts should be considered.

5. Slow occlusion of the hepatic artery: We have used this, together with ligation of the splenic and the left gastric arteries, with the hope that a better collateral circulation will take place in the liver and that the competition in the hepatic arterial inflow and the portal venous inflow will be decreased, thereby facilitating a more ready egress of blood from the cirrhotic liver. The cause of portal hypertension is probably due to hepatic venous impedence which occurs within the liver distal to the sinusoidal-hepatic venous juncture. When competition between portal venous and hepatic arterial pressures is lessened, a more ready egress of blood occurs through hepatic veins. We have shown this in animal and perfusion experiments as well as in patients. Catheterization studies in the hepatic veins have shown that whether a venovenous shunt or hepatic arterial occlusion is employed the portal venous pressure ultimately rises to pre-operative levels. However, this does not necessarily mean that the varices will begin to bleed again. Since we have used the gradual methods of hepatic arterial occlusion close to the liver our results have improved.

Ascites

THE TREATMENT of ascites due to portal hypertension is unsatisfactory although many methods have been devised for its amelioration. In addition to the medical measures previously described these patients require plasma proteins which are being depleted and cannot be synthesized in sufficient amounts by the crippled liver.

A great accumulation of ascitic fluid is not only extremely uncomfortable but may also interfere with vital functions sufficiently to endanger life. The fluid interferes with respiration, producing anoxic anoxemia, and venous return to the right heart is impeded so that there is pooling of blood in the liver and abdomen. Thus the more highly oxygenated portal venous blood soon loses much of its oxygen when ascites accumulates under great pressure. This decreases the total amount of circulating blood volume and increases anoxemia, owing to circulatory stagnation.

Both processes tend to increase the formation of ascites because the reduction in circulating blood volume attracts intercellular fluid into the blood stream with consequent hemodilution. The anoxemia in turn increases the trend toward more capillary leakage. Ascites interferes with digestion and elimination; consequently appetite is lost. In fact the anorexia is so pronounced that it is almost impossible to supply basic caloric requirements. This in turn depletes the protein reserve thereby decreasing the osmotic index of the blood and thus favoring more ascitic fluid formation. Lastly, sodium excretion is greatly diminished so that most cirrhotic patients have a retention, not only of sodium but also of nitrogenous material and azotemia develops. Therefore the fluid must be removed from the peritoneal cavity although it will soon reform and although we know how very vital it is to conserve all of the plasma protein that we can.

Paracentesis is a very old procedure but it is not entirely innocuous. The sudden removal of a large amount of fluid may produce fatal shock. This results from the decrease in intra-abdominal pressure and a rapid pooling of blood in the splanchnic bed. It is, therefore, perhaps better to remove small quantities at frequent intervals than large amounts at any one time—not only because of the dangers alluded to but also because it favors more rapid reformation of fluid. This latter effect is due chiefly to the loss of pro-

tein thereby reducing osmotic pressure and to the decrease in extravenous pressure enhancing portal venous hydrostatic pressure. There have been attempts to establish permanent types of drainage for the ascitic fluid by the use of subcutaneous channels made of plastic or metal tubes; also by anastomosis of the peritoneum to the saphenous veins, to the renal pelvis to the subcutaneous space, and even by resection of the parietal peritoneum. Also methods have been devised to improve collateral circulation such as the omentopexy of Talma, anastomosis of sigmoid veins to saphenous veins, the splenic veins to the left renal or the portal vein or its branches to the inferior vena cava or its branches. Most of these methods have been unsatisfactory although some favorable results have been ascribed to shunts, chiefly between the splenic vein and the renal vein and between the portal vein and the vena cava. However, occasionally ascites will cease spontaneously and rarely simple exploration will ameliorate it.

We have found that the best method surgically for the treatment of persistent ascites is the slow occlusion of the hepatic artery close to the liver together with ligation of the splenic and left gastric artery close to the celiac axis. We have one patient who has now gone seven years without re-formation of ascites although he has adhered to careful dietary management.

Summary

I HAVE TRIED to outline some of the more generally accepted methods of treatment of cirrhosis of the liver. The principal concepts I should like to emphasize are:

1. The cause of post-necrotic cirrhosis are not definitely known. Therefore the liver should be protected insofar as possible from hepatotoxic agents, particularly in patients who have been known to have some form of liver disease. This is particularly true of virus hepatitis in which the ultimate results are unpredictable. In other words I have stressed prophylaxis in the avoidance of post-necrotic cirrhosis of the liver.

2. Once the disease has occurred, the duties of the physician are clear. He knows the chief functions of the liver and he must try to lighten its load.

3. In the far advanced case of cirrhosis, lethal complications may occur. Two of these have been discussed, namely, bleeding esophageal varices and ascites. The medical and surgical management of these conditions has been reviewed. However, much remains to be desired in both forms of treatment at the present time.

4. The liver has great powers of regeneration. The experimental animal tolerates a resection of four-fifths of the liver and will regenerate enough to take care of all of its functions. We have recently operated upon a five-day old infant removing more than half of the liver substance because of hemangioma and as far as we are able to tell now, two years later, there has been absolutely no interference with the functions of that organ.[3] Consequently, it behooves us to assume the attitude that if we can arrest the destruction of liver cells and, by medical or surgical means, protect those that remain, then revascularization and regeneration will ensue.

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Better Word?

THE CONCEPT of "absenteeism" needs broadening. The word itself is defective. It is a cousin to "accident-proneness." It denotes a disposition to being absent, and thus makes a trait of what may in effect be a great variety of different disabling conditions. Perhaps the time has come to retire this word, which is technically inappropriate except within its much smaller, rigorous meaning. Its fatal weakness is that its sole criterion is attendance, and that it fails to distinguish those days when the employee should be absent. Disability absence is overwhelmingly caused by bona fide illness and injury. Attempts to deal with disability by exhorting employees to avoid truancy; attempts to "control" disability absence primarily through policing and penalties, however effective they may be in dealing with other causes of absence, are limited in relation to disability. For the greatest gains in overcoming disability absence, labor is counting on expanded programs of preventive care, early and accurate diagnosis, effective treatment of disease, and the further development of rehabilitation in the conquest of severe disability.

—From "Absence from Work Due to Non-occupational Illness and Injury: What Is Labor Doing About It?" by JEROME POLLACK, Program Consultant, UAW Social Security Department, presented at the Sixteenth Annual Congress on Industrial Health, AMA, Detroit, January 24, 1956.

The Optimum Time For Return to Work Following Various Major Cardiovascular Disabilities

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OUR STUDY of sickness disability over the past few years has indicated to us that the case of chronic illness is far more apt to be a straightforward medical problem than is the repeated short-term absentee.[1,2] The latter may be amenable to a variety of combined management, employee relations and medical measures but rarely depends *primarily* on medical knowledge or skill. Chronic disability, on the other hand, is basically a medical problem with secondary social complications. This is the area where medicine in industry should be most productive. First, in preventing the onset of these diseases wherever possible; second, in shortening the period of distress to the patient and his family when they do strike; and third, preventing needless loss of productive income to the employee and society by doing everything possible to rehabilitate him as rapidly as possible.

The commonest cause of chronic disability in the American work force today is cardiovascular disease.[3] Considering its importance, there have been relatively few factual studies of the average duration of disability associated with the various entities in this group of diseases. Although much has been said about the desirability of rehabilitating the victims of cardiovascular disease, specific criteria for evaluating their return to work are hard to find.

Basic references on the subject include Gafafer's tabular summary of the duration of disability in excess of seven days in Public Health Reports in 1948,[4] Franco's report on Cardiovascular Disease in Industry in 1951[5] and his supplementary study entitled "The Cardiac Can Work" in 1954,[6] a panel discussion, "Heart Disease in Relation to Employment," in 1950,[7] Dennison's "Evaluation of the Cardiac in Industry" in 1954,[8] and Hansen and Weaver's "Arteriosclerotic Hearts at Work" in 1955.[9]

To supplement the information available in these sources, the records of losing-time cardiovascular cases during 1955 in the Manufacturing operations and the New York Office of the Esso Standard Oil Company were reviewed. Cases in the Marketing operations were excluded because their widespread distribution did not permit personal review within the time available. This population totals 17,600 in eight locations from New England to Louisiana. White males predominate. A uniform policy of sickness benefits and disability retirement is in effect. Medical care of individuals away from work due to non-occupational causes is their own and their personal physician's responsibility. Most individuals in the group are enrolled in a standard type Blue Shield-Blue Cross Plan or an employee supported medical cooperative plan.

The payment of sickness benefits depends on Medical Department certification. This, in turn, is usually based on data furnished by the employee's doctor supplemented by visiting nurses' reports and examinations in the department when indicated. Every case absent for any significant cause or for more than a week is seen by a physician before returning to work. Our concern is to insure that a generous sickness benefit program is used constructively to insure optimum recovery from an illness before return to work. Such a program, together with an active periodic examination program gives a fairly complete picture of the history of the individual, his illness and the problem of returning him to work.

Although this brief survey gives a reasonably wide spectrum of age, geographical location, job situation and types of medical care, certain artificial factors are invariably present. Any study which involves a sickness benefit program will

I HEART DISEASE
- A. CORONARY ARTERY DISEASE
- B. CONGESTIVE HEART FAILURE

II CEREBRAL VASCULAR DISEASE

III ESSENTIAL HYPERTENSION

IV PERIPHERAL VASCULAR DISEASE
- A. THROMBOPHLEBITIS
- B. VARICOSE VEINS
- C. MISCELLANEOUS

Chart I.

Presented at the Symposium on "The Optimum Time for Return to Work Following Various Major Disabilities," at the Forty-First Annual Meeting of the INDUSTRIAL MEDICAL ASSOCIATION, at the INDUSTRIAL HEALTH CONFERENCE, Philadelphia, April 25, 1956.

usually have full or partial pay provisions affecting duration of disability. Such a program may on one hand encourage prolonged convalescence or, on the other hand, exert economic pressure to return earlier than medical reasons indicate. Where long service employees predominate in a group such an artificial time line usually occurs at the end of 12 weeks.

The term "optimum duration of disability" has many connotations—purely *medical* and, therefore, capable of being related to best physiologic function; *psychological* or related to the patient's attitude toward his present illness; *social* or related to his family's tolerance of his disease, his fellow-worker's willingness to lend a helping hand, his employer's sense of responsibility toward a loyal and valued employee; *economic* or related to his total resources as far as this illness is concerned and his plans for his own and his family's future.

No claim is made that the results detailed here have statistical significance as "optimal." They do provide the framework for discussion about the things we think are necessary to attain that goal. In the charts to follow we have shown what happened to the entire group in each category who were reported as losing time, whether they returned to work, retired or died. Our object in this was to illustrate the extremes the disease may take. We have not included the retirement cases or the deaths in the calculation of mean or median duration of absence since we are primarily concerned with the group who succeeded in returning to work.

With this introduction we may now consider some of the commonest cardiovascular conditions producing disability:

Coronary Artery Disease

THE MOST frequent form of heart disease encountered in a predominantly male working population is atherosclerosis of the coronary arteries. In Gafafer's study,[4] all forms are grouped under one heading and averaged 114.8 days away from work. Over half of the cases were absent 11 to 12 weeks.

If this disease entity is divided according to severity, three natural subdivisions suggest themselves, namely, coronary insufficiency or anginal syndrome, myocardial infarction, and congestive failure. One individual may progress through all three phases at different times or demonstrate combinations of two of the groups. Usually a single absence can be attributed to one of the three predominating. Congestive failure is considered as an entity with many possible etiologic causes later in this discussion.

Coronary insufficiency or anginal syndrome is diagnosed when an individual develops substernal pain (often with radiation to the arms or neck) related to exertion, relieved by rest or nitroglycerine. In many instances the electrocardiogram shows depression of the ST segments and inversion of the T waves during an attack or after exercise with a prompt return to normal with rest and treatment. Where such objective confirmation is not obtained, the diagnosis depends primarily on a reliable and typical history. Cases of "atypical angina" are not infrequent but usually require careful diagnostic study by a cardiologist. They shall not be considered here.

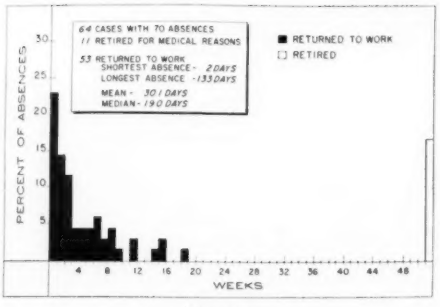

Chart 2.
Coronary insufficiency.

At times the anginal syndrome is the precursor of a myocardial infarction and follows a short, crescendo course. At other times, it pursues a rather low grade intermittent course with exacerbations and remissions days or weeks in duration. This is shown in Chart 2 where absences from two to 365 days are recorded.

The mean of 30.1 days for those returning to work compares more closely with Franco's[5] figure of 20.2 days in anginal patients than it does with Gafafer's[4] figure of 114.8 cited above. The shorter absences occurred under several circumstances. Some were known cases of coronary disease who suffered brief increases in pain in unusual situations where the question of more serious trouble was resolved in a few days. In other instances, the onset of classical angina was particularly frightening to the individual for a day or two but he returned to a clerical job within a relatively short time. Almost identical clinical situations occurred in men normally engaged in heavy physical work. Here, however, the absence usually extended several weeks and was followed by at least a temporary job modification against climbing, running, or heavy lifting for several months.

In 25% of the absences ultimately ending in a return to work, the period extended from eight to 18 weeks. These were individuals with frequent, moderately severe angina at rest or with minimal activity which resisted accepted methods of treatment or where placement under severe though temporary medical restrictions was not possible. In a few instances, these people presented an initial picture strongly suggestive of myocardial infarction which led to hospitalization. Persistently normal electrocardiographic findings, lack of fever, leucocytosis, or changes in sedimentation rate, and rapid clinical recovery prompted their classification as "insufficiency" rather than "infarction."

In about one-sixth of the cases, the individual continued to have repeated episodes of such severe angina that he could not return to his old job even after a year of disability. Under the provisions of the benefit plan for this group, this usually meant a disability retirement. Not all of

these people were completely disabled—some had the physical capacity for sedentary jobs but did not have the aptitude or incentive to be retrained for them. Although not shown on this chart, we have seen an occasional case return to a job requiring moderate activity after temporary retirement for several years. In most cases absent for more than a year, psychological obstacles to return are more formidable than physical ones.

The evaluation of the patient with angina for continuation on the job or return to work can be systematized but is by no means routine. First, the diagnosis is verified. It is far easier, unfortunately, to pin the diagnosis of coronary artery disease on a patient than it is to untangle the threads of induced cardiac neurosis. In a reliable patient, a clear cut story of repeated exertional chest pain relieved by rest or nitroglycerine is sufficient. An abnormal electrocardiogram recorded during a spontaneous attack is excellent objective confirmatory evidence when available. An exercise tolerance test is not recommended except in the cases where the history is doubtful and the resting electrocardiogram is normal.

Next, one must decide if sudden disability or death on the job would endanger the lives of others. If so, change in job assignment is advisable. Once these decisions have been made, a third consideration is whether the disease is stabilized, getting better, or worse. Then comes the question of adequate treatment—weight reduction, reduction of blood pressure, sedation, vasodilators, etc. Finally comes the assessment of the physical and emotional demands of the job. Although the patient's analysis of this is very important, some objective check points should be available to the doctor wherever possible. Ideally, the doctor should go out and look at the situation himself. Practically, he usually has to depend on someone else's observation—the supervisor or job analyst if he is an in-plant doctor, the industrial physician or personnel man at the plant if he is in private practice, or the Work Classification Unit where major change in employment is involved.

With this information, a comparison of the patient's activity at home can be made with the apparent job demands. If there is no angina on home activity and the demands of the job are approximately equal, no real problem exists—a trial at regular work is indicated. Where the job activity is greater than home activity, some temporary transition period can usually be arranged with the idea that the man will return to full duty in a few weeks. If this trial period results in the development of symptoms, the period may have to be extended. Ultimately it will be apparent what the person's limits are. The definition of the limits as to how much walking, climbing, lifting, exposure, etc., is a medical one. The final decision whether to accept a man for a job with specific restrictions is a management one.

In a number of cases, no matter how much clinical information and job evaluation are available, the only way to determine whether or not a man can work is by a trial on the job. At times this must be done in the face of minor anginal attacks. Although some risk is involved, a "stabilized" case of angina can be tried at work if he is anxious to do it, has a realistic view of his own situation, uses his medication intelligently, and the occurrence of angina is as related to normal non-occupational effort as it is to job effort. For example, a clerk develops angina if he eats carelessly, persists in walking against a cold wind, or gets into arguments with people. His ordinary job assignment calls for him to work on one floor level, at a job which does not subject him to intense emotional pressure. We are justified in taking the risk that he will disregard medical advice occasionally, walk into the office some cold morning, eat the wrong thing for lunch, or get in an argument with a fellow employee. Such a patient may have to take nitroglycerine several times a week for years, but he is frequently able to carry out a useful job.

Time does not permit further discussion of the variables to be encountered in this fascinating subject. We must proceed to a review of a more severe form of coronary artery disease—myocardial infarction. Pain and dyspnea are the cardinal but not inevitable symptoms of infarction. Shock, sweating, restlessness, and fever are frequent. Poor heart sounds, pericardial friction rub, and drop in blood pressure are confirmatory physical signs. So-called typical electrocardiographic patterns have been described which are diagnostic when present. In their absence, interpretation of serial changes by an expert electrocardiographer can confirm the diagnosis. There are occasional cases of small infarction which do not produce any significant changes on the electrocardiogram, but close observation of the clinical findings yield an adequate diagnosis.

Chart 3 shows our experience with cases diagnosed as myocardial infarction. For comparison, we might note that Franco's study of 120 similar absences in 1951[5] showed an average absence of 42.7 days. His later paper in 1954[6] discussed 66 absences averaging 87.2 days. The difference between these two reports was due to the fact that the second series only included absences longer than 60 days. Gafafer's data showed an average disability period of 115 days.

The chart reflects the rather wide variation in clinical pattern seen in this condition. The mortality rate of 41.6% is startling at first glance

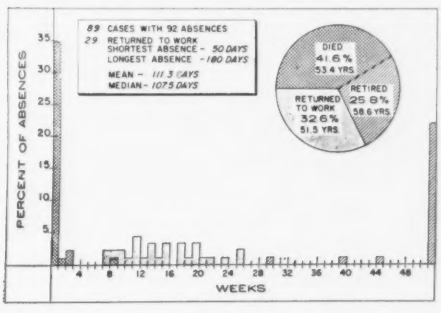

Chart 3.
Myocardial infarction.

since we are more apt to recall the figures derived from patients surviving long enough to reach a hospital. Actually this falls fairly close to the experience reported by Russek et al[11] in a study of 1047 cases of acute myocardial infarction—a mortality rate of 33.4% for all ages was reported, 28.8% observed in the age group under 60, and 40.1% in the group 60 years of age and over. Schnur's studies,[12,13] have shown the mortality rate for a given emergency hospital may range from 40 to 71% from one year to another.

We believe that the distribution of disability shown here reflects fairly well present-day treatment of the condition. In the classical case with moderately severe pain, mild shock, fever, leucocytosis, and serial electrocardiographic changes considered typical of infarction, opinion still favors a period of bed rest or bed-chair routine at home or hospital for four to six weeks and then graduated convalescence for six to eight weeks. Return to work usually involves shortened hours and fairly severe restrictions against lifting, climbing, running, or heavy physical activity for a month or two. If all goes well, the restrictions are gradually lightened until full duty status is attained in six months to a year provided the individual has no angina, failure, or cardiac enlargement.

Variations naturally occur in this pattern. Certain mild or "silent" cases are sometimes discovered weeks after they have had their attack. Provided they are asymptomatic, they frequently do well on a modified rest program at home for several weeks and can return to regular sedentary work or restricted physical effort on a similar progression schedule to that outlined above.

More frequently, problems are encountered at the other end of the scale. The individual with a classical infarct may convalesce more slowly owing to thromboembolic complications, angina, or mild congestive failure. On occasion, symptoms of a psychic nature appear in clearly recognized form or intertwined with mild angina. Unless they are really bizarre in character, they usually must be treated with respect for an additional period of time. There comes a time, however, when additional convalescence for such patients becomes harmful. If they are not to become fixed cardiac neurotics, they must be pushed back to work. The statements made concerning the anginal syndrome and retirement can be applied to cases of myocardial infarction. Angina or failure may lower their work capacity to where they are unemployable.

Attempts have been made to provide quantitative guides to measuring recovery from myocardial infarction. Benton and Brown[14] have reported measurement of oxygen consumption in various stages of recovery, and Schneider and Korjiovich[15] have studied the oxygen demands for various types of work. Hellerstein and Goldstein[16] in their application of these studies at the Cleveland Work Classification Unit state:

"In our experience one half of the patients with myocardial infarcts improve physically within three months to be able to expend two to five times

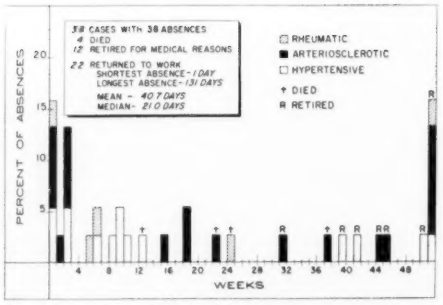

Chart 4.
Congestive heart failure.

the resting oxygen consumption without difficulty. This energy cost is approximately equivalent to climbing steps at the rate of 15 per minute for five to 10 minutes.

When the patient has advanced to the point that he is able to withstand an estimated expenditure of energy of two to three times resting level, has made an emotional recovery and has had a return of temperature, pulse, respiration, and sedimentation rate to a fair control level, consideration should then be made for the return of the patient to the occupational world. This may be from two to four months after the acute episode."

Improvement in the psychological handling of patients in the early stages of a myocardial infarction would undoubtedly lessen the problems of adjustment when they attempt to return to work. There is still too great a tendency to emphasize the need for rest and quiet in terms of dramatic strictures against moving a muscle instead of taking the time to talk quietly and reassuringly to the patient about his condition during the first few days after his attack.

An interesting program was reported by Newman et al[17] at a Veterans Administration Hospital where a physical therapist was introduced to the patient within a few days of his attack. Although nothing in the way of passive or active physiotherapy was done until the end of the first or second week, distinct psychological benefits were noted from inferring to the patient that his return to a physically active life was already being planned. Progressive muscle tone maintenance exercises were started under the attending physician's direction and prevented much of the weakness and loss of peripheral vasomotor control due to prolonged bed rest.

While skilled physiotherapists are available to only a fraction of those suffering myocardial infarctions, many of the benefits outlined in Newman's program are available with little more effort on the part of the average practitioner. The attending physician must show by constant reemphasis that he does not regard myocardial infarction as a death sentence or the end of a useful business and social existence.

Congestive Heart Failure

ONE OF THE problems faced in considering congestive heart failure as a cause for disability

is its definition. It may range from the dyspnea and basal rales accompanying a paroxysmal arrhythmia in a person over 50 to massive anasarca or dyspnea at rest of the advanced stage of rheumatic heart disease. Chart 4 shows the variations that may obtain in a small series.

Those absent less than a week were found in the arrhythmia group mentioned previously; in very early cases of mild failure who respond promptly to salt restriction and digitalis; or those who had been in failure before, had slipped back briefly, and could be rescued promptly with mercurial diuretics or Diamox. In general, the work assignments of this group were not too demanding and home activity was not significantly less than that required at work.

Where any noticeable degree of failure has existed for a week or more, or coincides with infection, obesity, etc., and the job is a fairly vigorous one, an absence from three to six weeks can be anticipated. Bed rest or marked restriction of activity is needed in addition to digitalis, salt restriction, and diuretics to restore compensation.

In general, individuals whose failure is on a rheumatic or hypertensive basis did slightly better than those with arteriosclerotic heart disease. There were no instances of syphilitic heart disease in this particular group, but in general they can be expected to do poorly once they develop failure.

Where heart failure persists more than four months in spite of adequate treatment, the outlook is poor for return to anything but the most sedentary type of work. In some of the cases shown as retired in Chart 4, their failure may have cleared enough for them to do work not requiring a lot of walking, climbing, lifting, etc., but such work might not have been available. For comparison, Gafafer's study showed mean duration of absence of 124.9 days for chronic affections of the valves and endocardium, and 122.4 days for diseases of the myocardium. A closer approximation to our experience is that reported by Franco in 1951. He noted that hypertensives in failure averaged 28 days absence, rheumatics 38.9 days, syphilitics 47.4 days, and arteriosclerotics 52.2 days.

A number of factors other than the strictly medical phase of their response to treatment influences duration of disability and chance for successful rehabilitation of these patients. One is their ability to understand and accept the concept that they have a chronic condition with which they must live. Their physical resources are limited and must be expended cautiously at home and at work. Many a recurrent failure can be traced to "forgetting" to take their digitalis, eating the forbidden salted peanuts, resuming the evening glass of beer or two or three, or mowing the lawn on a balmy June day. A second factor, of course, is the individual's drive to remain at work. If the economic incentive is strong or the job situation appealing, the patient's adherence to his doctor's advice is likely to be much more faithful.

The patient recently recovered from an episode of congestive heart failure may be evaluated for return to moderate physical work by the following standards:

1. The attainment of pre-failure weight or less and the maintenance of that weight level despite average ambulatory activity around home for at least a week.

2. The absence of pretibial edema, tender enlargement of the liver or basal rales for at least a week following the last mercurial diuretic.

3. A resting pulse below 90/minute and a pulse deficit, if present, not greater than 10/minute. After a practical test of exercise tolerance (climbing two flights of stairs at a normal pace) the pulse rate should return to the pre-exercise level in three minutes or less. During the same test, the degree of dyspnea can be observed and if present in mild degree, should disappear within three minutes.

If these requirements are met, the individual may be returned to work on a restricted basis if at all possible for a week or two. Activity at any one time during this period usually does not exceed the equivalent of climbing two flights of stairs. At the end of a week, the patient is rechecked to make sure he is retaining compensation, to check his fidelity to treatment, and to measure the amount of extra effort needed to bring him up to the activity of his regular job assignment. If all findings are favorable, regular work can be attempted with a recheck scheduled for another week. Once this is successfully negotiated, further followup visits are scheduled at intervals of three to six months to make sure the patient continues under regular medical supervision, that he is aware of the special precautions he must take during certain seasons of the year (unusual heat or cold, snow, etc.), or following the onset of unrelated medical conditions —infection, operation, etc.

There are no fixed guides for measuring the extent of permanent restriction needed where the individual cannot return to his original job assignment. Placement frequently means an educated guess on the doctor's part plus repeated trial and error. The criteria outlined above give a rough idea of a given patient's limits. If he does not meet them, the decision may be to have him remain away from work entirely for further treatment one or more weeks. Where repeated observations indicate a plateau of compensation has been reached, then the doctor must try to estimate the limitation in terms of so many hours standing, walking, climbing, etc. This work prescription can be applied against a number of jobs until one is found that matches fairly well. Trial at work is then carried out with careful medical followup. Several such attempts may have to be carried out before a successful "fit" is attained.

Cerebral Vascular Disease

THE MAJORITY of patients included in this category (Chart 5) suffered sudden episodes of localized cerebral dysfunction, motor or sensory in character.

Clinically it was difficult to distinguish whether

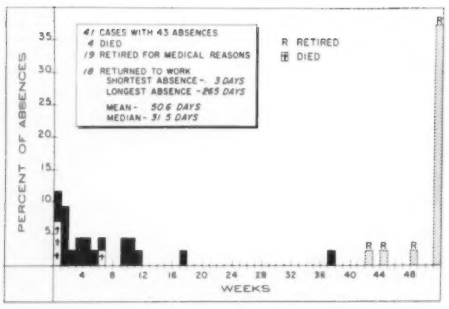

Chart 5.
Cerebral vascular disease.

these represented areas of thrombosis or hemorrhage. There were no recognizable instances of embolism. In one instance, generalized cerebral ischemia secondary to heart block occurred. Several cases showed gradual mental deterioration apparently secondary to diffuse cerebral arteriosclerosis.

Three patients expired in less than 24 hours and one after seven weeks as a result of extensive brain damage. Thirty-five% of the survivors who returned to work suffered brief periods of disability of three days to two weeks duration as a result of small hemorrhages or thromboses (in some instances diagnosed as cerebral vascular spasm). These were characterized by brief periods of hemianesthesia or minor motor weakness. Their recovery was prompt and complete and they were able to return to their regular jobs where these did not involve climbing to unprotected heights, work near moving machinery, or driving motor vehicles.

The remaining 65% of the group returning to work were absent from three to 38 weeks. For the most part, they suffered significant temporary motor impairment of an arm or leg. Complete or partial return of normal function occurred so that they were able to return to regular work or to some useful restricted work.

Forty-eight % of the survivors were retired for medical reasons. These included individuals with persistent severe motor damage or thinking difficulties associated with general cerebralvascular disease. A situation similar to that seen in other cardiovascular disabilities exists here, namely, type of job available bears directly on successful placement. A clerk with minor residual weakness of the left arm and leg may return where a rigger with the same defects may not. A laborer or a janitor with some blunting of the faculty for making fine judgments may perform adequately while an accountant or an executive may make repeated costly mistakes and have to retire.

There has been a widespread tendency to take a very gloomy view of any cerebral vascular accident. In actual fact, as Rusk and his co-workers[19] have shown, the salvage rate is a respectable one where motivation is good and a systematic effort at physiotherapy and retraining is made. They reported on 1000 patients with moderate to severe disability with an average age of 63, seen on the average of nine months after disability began. Following an average training time of seven weeks, 900 of these were taught to walk, to manage their bladder and bowel needs, to dress themselves, and to live outside an institution. Four hundred of the group returned to some gainful work.

In their experience, the following types of patients are excluded from rehabilitation:

1. Cerebral arteriosclerosis associated with memory loss and confusion so that they cannot remember what they are taught.
2. Low cardiac reserve so that they cannot tolerate activity.
3. Severe malignant hypertension with poor prognosis.

Our experience parallels this closely. Following a moderately severe stroke, at least three weeks bed rest or bed-chair activity is needed to insure adequate healing. Graded activity usually parallels return of function over the next two to six months. Return to work is planned when the person can walk up to the amount required to get to work and carry out the job assignment and can use his arms and hands to write and do moderately heavy lifting (up to 35 pounds). No reassignments are made to jobs involving heavy manual labor, working above unprotected ground level or near moving machinery, driving company vehicles, or where unusual emotional stress is involved. Careful follow-up on the part of the plant physician and the first-line supervisor is required. At times, even restricted assignments bring to light disabilities which were not obvious at the time the return-to-work examination was made. The doctor must be prepared to modify his work prescription if the initial trial places the patient under too much stress. On the other hand, additional expert retraining may be necessary before the full work load is handled. The supervisor must be alert to see that the employee does all that he can do and is not hedged around with limitations either self-imposed or encouraged by fellow-workers. A non-productive "sit in the corner" return to the job environment can be just as harmful to ultimate rehabilitation as over-activity.

Essential Hypertension

WHEN THE individuals with frank cerebral vascular accidents, angina, cardiac failure, or uremia secondary to hypertensive disease have been excluded, there still remains a sizable group with symptoms referrable to hypertension. At times these become so annoying to the patient, or his blood pressure level becomes so disturbing to his physician, that he absents himself from work for treatment.

Chart 6 shows the duration of disability in a group of this type.

Symptoms of headache, vertigo, epistaxis, nervousness, transient paresthesias and vague substernal oppression predominated. Although these things may be of very short duration in a number of cases, causing absences of from one to four

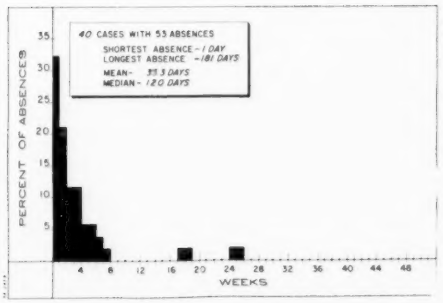

Chart 6.
Essential hypertension.

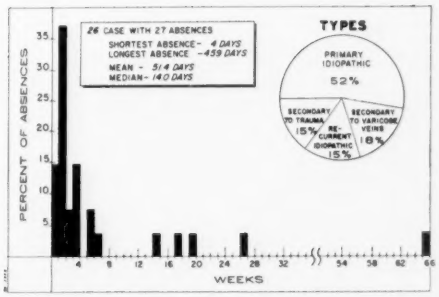

Chart 7.
Thrombophlebitis.

days, frequently the absence extends well into three or four weeks. This is particularly true since the new, more potent anti-hypertensive agents such as Apresoline or the ganglionic blocking agents have come into use. Several of the patients in this group had their disability prolonged because of their difficulties with side-reactions when the dosage of these agents was being adjusted.

Where the absence for simple hypertensive disease exceeds five or six weeks, it usually is due to some unusual medical or social complication or to the fact that the disability is predominantly psychiatric in nature. For example, the longest one in the group shown (181 days) followed a 42-day absence for bilateral herniorraphy in a 62 year old man who had made up his mind to retire. Complaints related to hypertension persisted until his own physician and the plant doctor agreed that he should either retire or return to work. The next longest case was a rapidly progressive malignant form of the disease in a man of 37. His absence began with a brief bout of acute left ventricular failure, but blood pressure levels of 270/170 kept him out under intensive treatment for 173 days until he improved enough to return to work with severe restrictions.

The insignificant variations in the average age of the groups as the duration of disability increased indicates that this was not a major factor. Neither was occupation in this particular series. It is conceivable, however, that the latter might play a role in some situations. For example, a truck driver, a rigger, a lineman, or a painter might be advised to remain away from work under treatment if his blood pressure remained above levels in excess of 220/120 or a cerebral or cardiac disaster appeared impending. While an employee might return to clerical or ground level work without undue risk, it might be unfair to him or his fellows if he were required to climb in unprotected areas, drive a vehicle, etc.

Thrombophlebitis

RATHER WIDE variations in the duration of absence due to thrombophlebitis occurred.

In this series, as shown in Chart 7, an insignificant superficial phlebitis may subside in four days or a tenacious, postoperative widespread infection of the veins may incapacitate a man for well over a year. There was no significant correlation between the length of the absence and the age of the patient or the type of thrombophlebitis.

At the onset of an attack of phlebitis in a given patient, one may anticipate, with accepted treatment by bed rest, moist heat, antibiotics, and anticoagulants, a return to regular work in three to four weeks. In some, elective surgery on varicose veins may be planned on at a future date. Special consideration may be required for those in jobs requiring prolonged standing or sitting with the legs in cramped positions.

Criteria for return to duty include the absence of local redness, heat, swelling, and pain; a normal leucocyte count and sedimentation rate; and the use of protective elastic stockings or other supports. Return to work should be accompanied by detailed instructions about frequent mild exercise, the avoidance of constricting items of clothing and local trauma.

Varicose Veins

UNCOMPLICATED varicose veins may cause considerable personal discomfort but rarely cause significant loss of time from work.

Those shown as medical cases in Chart 8 lost between one and five days for ankle edema, diagnostic visits to their physician, etc. The development of ulcers secondary to venous stasis had more noticeable effect as shown by absences up to 47 days duration. Where definitive treatment of the underlying problem of varicose veins is not undertaken, they have a great tendency to recur. In some instances where the drive to work is

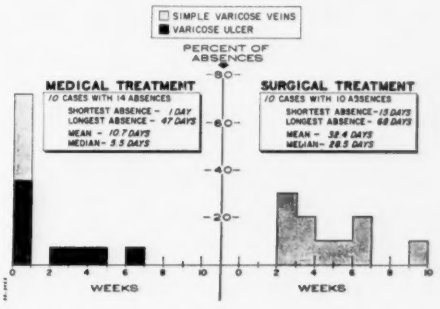

Chart 8.
Varicose veins.

strong and the individual has an agreeable situation as far as prolonged standing or sitting is concerned, they work despite the presence of the ulcer. Ultimately such cases usually require intensive care off the job; and, when they do, an absence of four or five weeks can usually be anticipated.

The question of disability following surgical treatment of varicose veins (ligation with or without stripping) probably should be answered by a surgeon rather than an internist. Chart 8 shows our rather small experience. On the average, we consider an absence of about four weeks reasonable where any extensive surgery is performed on the legs. We have had no experience with the ambulatory postoperative treatment which has recently been advocated.[20]

Criteria for return to work include evidence of good wound healing, absence of phlebitis, and the use of elastic supports during the early phase of return to full activity.

Miscellaneous

OTHER FORMS of peripheral vascular disease such as arteriosclerosis obliterans, thromboangiitis obliterans, scalenus anticus syndrome, frostbite, etc. appeared very infrequently in this series as causes of disability. Arteriosclerosis obliterans is seen in large number of diabetics and individuals over 60 but frequently is asymptomatic or productive of mild intermittent claudication. Where the latter develops, modifications in work assignment may be necessary to limit climbing, excessive walking or exposure to unusual cold. Rarely is the situation severe enough to cause lost time.

In the unusual case where an arteriosclerotic ulcer or gangrene of an extremity occurs, particularly in a diabetic, a prolonged period of disability is the rule. Absences of from two to six months can be anticipated. Placement of these people on recovery is difficult because severe restrictions against exposure to the elements and prolonged sitting, standing or walking must be issued and even small degrees of trauma to the feet can have serious consequences.

Summary and Conclusions

THE QUESTION of optimum duration of disability following various cardiovascular disorders has been discussed. Studies available in the literature and a brief survey of 318 cases occurring in the Manufacturing Operations and the New York Office of the Esso Standard Oil Company during 1955 were reviewed.

The variation of individual cases in the several groups was considered. Certain arbitrary statements about average length of disability can be made with full knowledge of their limitations as applied to the individual case:

1. Coronary insufficiency will usually result in three to four weeks absence.

2. Myocardial infarction will cause from 12 to 16 weeks disability.

3. Congestive heart failure irrespective of its etiology, usually means four to six weeks absence.

4. Cerebral vascular disease produces between two and six months absence.

5. Symptomatic essential hypertension without major cerebral, cardiac or renal involvement produces on the average from two to five weeks disability.

6. Thrombophlebitis will result in three to four weeks absence.

7. Varicose veins treated medically will average about a week of absence. Where surgery is undertaken four weeks will usually be lost from work.

8. Severe peripheral arteriosclerosis was not a common cause for absence in our experience. Where it is, the absence will be measured in months and return to full duty unlikely.

In conclusion, evaluation of a person with cardiovascular disability for return to work is a highly individualized matter. Average figures such as those outlined above can be given and certain criteria for measuring cardiovascular fitness suggested. Except in the obvious case, however, a carefully observed trial at work is the only sure way to judge the individual's capability. This should be tried in every case where failure will not endanger the employee's life or the safety of his fellows.

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Varicose Veins and Stasis Problems

The Industrial Physician's Interest and Potentialities

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WITH EVER-INCREASING employment, including relatively more females as well as older age groups of both sexes, coupled with the policy of industry to protect and provide the best possible care for its workers, the problem of venous disorders of the lower extremities assumes great importance for the industrial physician. It is his responsibility to employ all measures that will keep the worker at the job he is especially trained to do, to minimize loss of time from work, and, if possible, to extend the years of productivity. It is common knowledge that stasis complications account for much disability in industry, and there exists considerable misunderstanding between the worker and his physician as to the causative factors inherent in the worker himself *versus* those inherent in his job. It is the purpose of this paper to present some aspects of venous disorders of the lower extremity which are of particular interest to the industrial physician, and in which he may give advice or personally carry out the therapy.

From the clinical standpoint, there are three different types of varicose veins of the lower extremities that the industrial physician must distinguish. These are the primary type, the secondary type, and the telangiectatic type. Each has a different etiology, a characteristic clinical picture, and a separate therapy. While these will be presented individually, it must be remembered that occasionally the patient may have two or all three types in combination.

Primary Varicose Veins

INCIDENCE: Primary varicose veins are extremely common, and it is safe to estimate that they are of clinical significance in at least 3% of all individuals. They are absent during childhood and the severest cases make their first appearance with adolescence. In less severe form they may become evident and produce symptoms in the fourth and fifth decades of life. It is a progressive disease in most instances, and, making allowance for the aggravating factor of pregnancy, would appear to involve males and females about equally. Race, height, and body weight seem to have no direct bearing on its severity,[1] except that obesity may tend to conceal actual varices.

Presented at a meeting of the Surgical Section, INDUSTRIAL MEDICAL ASSOCIATION, Annual Meeting, Philadelphia, April 26, 1956.

How Primary Varicose Veins Develop: With regard to the hereditary tendency toward the development of primary varicose veins there is little dispute. Figures indicating this influence vary between 40 and 65%, but if blood relatives other than siblings are included, the percentage is approximately 90%. It has been observed that not only may several members of the same family in succeeding generations have varicosities, but also the pattern of the involved veins may be similar in all. Gross and microscopic studies[2,3] have indicated that absence of valves above the saphenofemoral junction, as well as absence of smooth muscle and elastic tissue in the vein wall opposite the valves (sinus wall), are the important hereditary factors in the production of primary varicose veins. It is important for the industrial physician to realize that occupational strain in itself will not produce primary varicose veins in a perfectly normal individual. Such patients may develop tired legs and functional strains, but spend a lifetime of hard work and prolonged standing without developing a single varicosity. On the other hand, the patient with a marked hereditary predisposition will develop varicose veins despite every effort to avoid their occurrence. It is in this group that protracted standing will accentuate the condition. Stasis is favored when the massaging action of muscular contraction on the deep veins is curtailed, thus retarding the emptying of the superficial veins.

Even though constitutional defects in the veins may be present at birth, the veins function normally during childhood because the elasticity of veins and skin is greatest then; the diameter of veins is relatively smaller; veins are still growing in length, minimizing tortuosity; hydrostatic pressure is less, since full height has not been attained; muscular movements are more active and more constant; and prolonged periods of standing, occupational or otherwise, are exceptional. With adolescence, these inhibitory factors lessen and are supplanted by aggravating factors. Under the constant stress of increased hydrostatic pressure by standing or increased intra-abdominal pressure by straining, the vein dilates first at its point of constitutional weakness, namely, opposite the valve cusps. Eventually, the valve cusps can no longer meet in the midline and thus valvular incompetency begins. When this process starts at the saphenofemoral junction or other perfora-

tor vein sites, retrograde flow of blood from the deep veins into the superficial veins is initiated. The varicose veins present themselves within the subcutaneous tissues as a straight tubular hypertrophy, tortuous type, saccular type, or combinations of these.

How Stasis Develops: In the patient with primary varicose veins, the deep veins and their valves are ordinarily normal. The varicosis is confined to the superficial veins and to the perforating veins that connect them with the deep venous system. The pathologic process consists of dilatation of the superficial and perforating veins, which renders their valves functionally incompetent. This permits a reversal of the flow of blood which normally is from below upward and from superficial into deep veins through the perforator veins. When the patient stands, the blood now refluxes from above downward and from deep to superficial through the incompetent perforator veins. This increase in venous pressure is transmitted to the venous capillaries in which a state of hypertension is developed, and thus stasis or decreased drainage of venous blood from the tissues ensues.

Complications of Stasis: Pigmentation, first in scattered focal areas about the malleoli and in the lower third of the leg, with later coalescence into prominent blotches, is one of the earliest signs of venous stasis and is due to rupture of the venous capillaries with intradermal deposit of iron pigment from the extravasated blood cells.

Edema due to stasis in uncomplicated primary varicose veins is usually minimal or latent, and becomes manifest only upon prolonged standing. This is purely a phenomenon associated with capillary venous hypertension and represents the diminished ability of the tissue fluids to pass the venous capillary endothelium owing to the increased mechanical pressure within the lumen.

Fibrosis ensues only after prolonged untreated edema, and is due to growth of fibroblasts within the protein-rich interstitial fluid. This later complication is manifested by a change from pitting edema to a brawny or leathery type.

Superficial phlebitis in the varicose veins follows the coagulation of blood when the opposing forces to return flow of blood produce complete stagnation. The clotted blood within the vein acts as a chemical irritant and a sterile venitis and perivenitis ensue. In unusual instances, probably when a minor break in the skin is also present, a suppurative phlebitis with bacteria may follow.

Ulceration is usually due to a combination of stasis, trauma, and infection. It is the most frequent and distressing sequel of long-untreated varicose veins. The trauma may have been so trivial as to pass unnoticed or may follow any minor contusion about the ankle or shin area. With a break in the skin, bacteria quickly grow within the edematous tissues. The acute ulcer thus formed fails to heal, unless adequate active therapy is instituted, and an indolent chronic or recurring ulceration frequently follows. It is obvious that the industrial physician must distinguish the purely traumatic ulcer from the one associated with pre-existing primary varicose veins. Some patients, possibly truly in ignorance, have tried to claim that not only the ulcer but the varicose veins have followed the trauma.

Cellulitis, due to hemolytic streptococci, not infrequently starts in the edge of a neglected varicose ulcer. The onset is heralded by a sudden increase in pain around the ulcer area, a zone of deepening and spreading reddish discoloration about the ulcer, and reddish streaks up the course of the lymph channels of the leg which drain the ulcer site. The regional lymph nodes become enlarged and tender. Profound systemic toxemia usually accompanies the condition.

Eczematoid dermatitis or varicose eczema is an intensely itchy vesicular eruption which characteristically starts in the supra-malleolar area, but which may spread over the dorsum of the foot, up the leg, and even beyond the limits of the actual stasis area. In some patients the dermatitis is due to epidermophytosis, although this may be difficult to prove by culture or microscopic examination. In still other patients the dermatitis may be an allergic manifestation of a fungus infection elsewhere in the body, such as the toes, groin, or fingernails. Finally, the patient may have a primary skin lesion such as psoriasis which manifests itself locally and intensely in the area of stasis. In the latter instance, the stasis is a contributory or aggravating rather than primary factor.

External rupture of a varicose vein about the ankle or shin area may occur owing to atrophy of the skin overlying the varix. This often becomes paper-thin and may rupture either spontaneously or from minor trauma. Subcutaneous rupture of a varicose vein sometimes occurs, with resultant ecchymosis and hematoma formation.

Treatment of the Uncomplicated Varicose Veins: It is obvious that the industrial physician can accomplish the most good by examining the lower extremities of his workers for primary varicose veins and seeing to it that protection is afforded before the complications of stasis develop. In industrial practice today there is no more reason to overlook varicose veins than to overlook a hernia. Two general methods are available, compressive or supportive therapy and surgical therapy. It is the authors' opinion that sclerotherapy is outmoded because of its dangers and ineffectiveness on a long term basis. A few diehards will still champion its use, but by current opinion and usage it is fading into discard.

Supportive treatment, which is entirely within the domain of the industrial physician, consists of compression of the superficial venous system from without. The best support is obtained from a properly fitted elastic stocking which extends from the base of the toes to the level of the tibial tuberosity and includes the heel (Fig. 1). Its chief advantages are uniform compression and ease of application. Seldom is it necessary for the stocking to extend above the knee, since protection against stasis is required only from the lower third of the leg downward. It is not enough

Fig. 1.
Heaviest type elastic stocking for prevention of stasis complications of primary and secondary varicose veins.

for the physician merely to tell the patient that he needs elastic support and leave the details to a druggist or surgical appliance dealer. Unless an actual prescription is written and the subsequent accuracy checked after the stocking has been obtained, little benefit may result and the patient in discouragement may fail to wear the appliance.

The prescription for elastic hose should specify (1) that the stocking be "made to order" from actual leg measurements; (2) the area to be covered (e.g., base of toes to level of tibial tuberosity, including the heel); (3) weight of material (e.g., heavy, medium, or light weight); and (4) designate which leg (i.e., right or left, or both). The stockings which we have found best for men in industry are heavy weight, seamless, one-way stretch (in circumference but not in length), made of rubber with mercerized thread but without nylon (which has a tendency to slide). For women, the medium weight stocking is preferable, in which a thinner grade of rubber is used. Light weight stockings are for summer wear, for milder cases, or when it is desired to include the thigh; these usually contain nylon. It is essential to include the heel when there is much stasis about the ankle. In mild cases the heel covering may be excluded, since this is the part of the stocking that wears out first. When the correct stocking has been obtained, it is well to advise the purchase of a duplicate one to wear on alternate days and also act as a spare during washing. The useful life of a stocking worn daily is about four months, and the patient should be instructed to obtain replacements at least three times a year, since elastic recoil is lost by wear and washing. Elastic stockings are to varicose veins what a truss is to a hernia, namely palliative therapy. At best they combat the altered physiology, but have no effect upon the altered anatomy. While they are indicated in patients who have associated deep venous insufficiency, or as initial treatment during stasis complications or pregnancy, it must be realized that, when applicable, surgery is the treatment of choice.

The rationale of surgical therapy entails two objectives: first, to interrupt retrograde flow of blood at all sites of perforator vein incompetence; and, second, to excise the actual varices by dissection under direct vision or by vein stripping. Best results from such therapy will be obtained by surgeons with special interest and training in this field. It is important for the patient to understand that primary varicosis is a progressive disease involving a diffuse area, and as such requires follow-up. Only through the joint cooperation of patient, plant physician, and surgeon can ideal results be obtained and maintained.

Treatment of the Stasis Complications: It is unfortunately true that even today most patients first seek treatment because of the stasis complications already described. Surgery during this phase is usually contra-indicated because of poor wound healing as well as the dangers of infection, thrombosis, aggravation of edema, or even pulmonary embolism. One notable exception exists of which the industrial physician should be cognizant, namely, thrombophlebitis in varicose veins of the thigh and ascending within the great saphenous trunk. In this instance an emergency high saphenous ligation should be done to avoid the danger of propagation of clot through the saphenofemoral junction into the deep venous system.

The specific compressive therapy for ulceration, phlebitis, and dermatitis is the application of an Unna's paste bandage or so-called "boot." These are available in sealed metal cans in which the bandage is kept moist and fresh by a wax paper wrapping and cellophane bag (Fig. 2). The bandage (4 inches wide by 10 yards in length) is impregnated with zinc oxide, gelatin, and glycerine; it is obtainable under such commercial names as Medicopaste Bandage, Dome Paste Boot, Gelocast, Cruricast, etc. Allergic reactions to the paste itself are practically unknown. The wrapping is started and anchored just above the malleoli and then wound around the heel and foot to the base of the toes, from whence it is continued up the leg to the level of the tibial tuberosity (Fig. 3). This wrapping should merely be laid upon the skin without tension, since the bandage is inelastic and will easily cut the skin behind the heel or over the dorsum of the foot. The bandage should not be twisted or reversed, as this is almost certain to make a cord-like constriction. The authors have

Fig. 2.
Modern type Unna's paste boot.

Fig. 3.
Ace rubberized bandage over Unna boot for additional compression and covering.

found it advantageous to have the patient dorsiflex and extend the ankle while the bandage is applied to that area to allow the proper adjustment for walking. A four-inch wide ace rubberized bandage is then applied over the boot (Fig. 3) to achieve the desired compression and also protect the clothing from the sticky bandage. The bandage should be worn for a week to 10 days, but the patient should be instructed not to hesitate to remove it before this time if any cutting or undue irritation is noted. A definite improvement, often dramatic, should be obtained, but it is usually necessary to apply the boot at weekly intervals for a month or more before ordering an elastic stocking or proceeding to surgery. Ambulation is actually beneficial, and, unless the complication is very acute or neglected, it is seldom necessary for the patient to discontinue work during this phase of therapy.

For superficial thrombophlebitis the Unna boot provides adequate therapy, and antibiotic therapy is not necessary, except for the unusual case that progresses to suppuration. Even for patients with ulceration, systemic antibiotics are not required, except in those instances with the additional complication of acute cellulitis. The ulcer area should be treated locally with an antibiotic ointment such as Bacitracin or Terramycin with polymyxin B and the excoriation of skin about the ulcer itself painted with 1% gentian violet solution. In small refractory ulcers we have found antibiotic powders useful, but for the average case they are irritating and produce a stinging pain. When the ulcer responds too slowly to the use of Unna boots, it is well to apply a foam rubber sponge about three inches in diameter over the ulcer, which has been first treated locally and covered with gauze, and use two Ace rubberized bandages for elastic support. The second bandage prevents slipping of the first and allows added compression. In dermatitis cases that do not respond to the Unna boot itself, we have found it useful to paint the eruption with 1% gentian violet solution first. In other instances in which a fungus infection is suspected, it is well to apply Desenex powder either directly or after a preliminary coating with gentian violet solution. External rupture of a varicose vein is a dramatic emergency, since a great deal of blood may be lost within a short period. Elevation of the limb and pressure over the bleeding area will stop the hemorrhage. A sterile gauze dressing with a foam rubber sponge for localized compression and two ace bandages applied from base of the toes to the tibial tuberosity will allow healing to occur. Thereafter, an elastic stocking should be worn, or preferably, surgical therapy should be instituted.[4]

Secondary Varicose Veins (Postphlebitic Leg)

INCIDENCE: The incidence of thrombophlebitis following surgical operations is about 2%. In approximately 25% of such patients with acute thrombosis, spontaneous resolution is complete. In the other 75%, however, varying degrees and types of disability remain. In this latter group ulceration is a complication in approximately 30%. With the large numbers of patients in industry subjected to surgery each year, it is apparent that the problem of care after return to work will frequently challenge the industrial physician.

How Secondary Varicose Veins and Stasis Develop: Secondary varicose veins are acquired because of thrombosis and inflammation primary in the deep veins and perforating veins. During the acute phase of deep thrombophlebitis the superficial veins dilate as collateral circulation. They do not become huge or develop greatly increased venous pressure at this time, because the involved perforator veins are blocked by thrombi which prevent retrograde flow of blood. After a period of a year recanalization of the veins accompanied by venous and perivenous fibrosis occurs and the involved veins become inelastic valveless tubes. In this condition there is a reflux of blood within the deep veins when the patient stands or strains, and muscular action is not as effective in draining blood back to the heart because of the loss of valvular function. This increased pressure in the deep veins is then transmitted through the defective perforator veins (which have recanalized) into the superficial venous system. The superficial veins then enlarge and develop increased pressure which produces a state of venous capillary hypertension as in patients with primary varicose veins. It is readily observed, however, that the problem of stasis in this instance is a much more serious one, since eradication of the secondary varicose veins does not correct the primary fault, which is reflux within the deep veins themselves. In addition, the original thrombophlebitis involves the perivenous lymphatics which become involved, during healing, in the perivenous scarring and develop variable degrees of obstruction. It is thus seen that the patient with a postphlebitic limb suffers from a deep venous insufficiency as well as an abnormal lymphatic drainage. This unfortunate combination results in chronic edema of the leg after prolonged standing, and leads to chronic malnutrition of the tissues in the lower leg. Chronic ulcer or "phlebitic ulcer" then develops, most commonly just above the medial malleolus. Pigmentation, in-

creasing induration due to fibrosis, chronic cellulitis, and eczema due to stasis dermatitis ensue.

Treatment of Postphlebitic Stasis: Current opinion and experience favor conservative therapy for deep venous inadequacy. The so-called principle of the "venous heart" is employed. By the physiologic "venous heart" under normal conditions is meant the upward propulsion of blood in the deep veins during muscular systole of the limbs, with prevention of reflux by closure of normal venous valves during muscular diastole. When the deep veins become valveless inelastic tubes, the massaging action of muscular systole is diminished and reflux is allowed during diastole by the incompetent valves. Proper elastic compression by a stocking or Unna boot aids the venous heart mechanism by (1) adding to muscular systole, (2) keeping the deep veins supported during muscular diastole and thus retarding the downward reflux of blood within the deep veins, and (3) forcing blood in the normal direction from the superficial into the deep veins. The most practical plan is to apply an Unna boot from base of the toes to level of the tibial tuberosity, including the heel, as already described for stasis complications of primary varicose veins. This should be worn for about 10 days and then removed for inspection of the leg. A gratifying improvement will usually be noted, but the progress will be slower than in the limb with primary varicose veins. It is usually necessary to reapply the boot in successions of 10 days for a period of eight weeks or more until maximal reduction of edema has been obtained and all skin lesions have healed. A proper elastic stocking is then ordered.

The postphlebitic patient who wears an elastic stocking has a "corrected" leg and not a "cured" leg. It is essential that he understand the nature of the permanent damage to the deep veins, and understand that the wearing of the stocking will minimize the possibility of further complications but is no guarantee. During lunchtime or any other possible rest periods the patient should keep the leg above heart level as much as possible.

The authors have never favored deep venous ligations to curtail deep venous reflux, and it is now generally accepted that this measure is usually ineffective or may indeed aggravate the condition. If the patient will wear the proper elastic hosiery, it is seldom necessary to resect the secondary varicose veins, unless reflux into the superficial venous system is not adequately controlled. Lumbar sympathectomy has been suggested for patients with a causalgia type of pain, but the authors do not enthusiastically recommend this procedure in such instances.

Telangiectasia

TELANGIECTASIA is a dilation of capillaries and small venules. This is usually a dermatologic condition, but viscera may be involved as well. The etiology may be congenital, hereditary and degenerative, or secondary to wind burn, roentgen rays, arterial or venous insufficiency, and hormonal changes of pregnancy. Minor degrees of telangiectasia of the skin of the lower extremities is a normal accompaniment to the aging process and occurs in both men and women, particularly about the malleolar areas. Of particular interest to the industrial physician are the scattered focal areas of dermal telangiectasia which occur commonly in the lower extremities of young women with thin or delicate skin. These may coalesce on the thigh or behind the knee and produce psychologic distress because of the cosmetic defect and also become enlarged, painful, and tender premenstrually. These spider-like patches are usually associated with small varicose veins which show prominently through the pale smooth skin of these women. There is little or no retrograde flow of blood through such veins and, except for the rare instance of rupture, stasis complications are unknown.

Women with the type of telangiectasia just described often develop clinical symptoms far out of proportion to the degree of organic varicosis. They complain bitterly of easy fatigability and aching, particularly behind the knee. Some claim that they can hardly straighten out the leg owing to pain. These symptoms are apt to be most pronounced just before the onset of the menstrual period. Emotionally unstable women or those with varying inadequacies will frequently refer their psychosomatic difficulties to their lower extremities where the objective finding of dilated blood vessels seems to justify their complaints. Those women who are sensible, well balanced, and like their work are satisfied with the simple reassurance from their doctor that the condition is constitutional, innocuous, and requires no therapy. At the other extreme are those who cannot be convinced that they must adjust to the situation, and who eventually find some specialist who, against his best judgment, attempts to alleviate the condition by sclerotherapy or surgery. The brownish discoloration from injections, the new telangiectasia that develops in the scar, or the painful keloid that follows will dissuade the experienced physician from attempting any mechanical therapy on such patients whose primary difficulty is psychiatric. On the other hand, it must be accepted that a goodly number of these women do have pain for which something should be and can be done.

The most simple and effective remedy for painful telangiectasia in women is full length sheer ace-nylon hosiery which is substituted for the ordinary silk stockings and attaches to the garter belt. It is emphasized, as previously in this paper, that this type of stocking should not be ordered for patients with actual stasis, but is excellent for symptomatic telangiectasia. In addition, acetyl salicylic acid or phenacetin tablets will usually alleviate the premenstrual pain.

Women with telangiectasia usually experience a marked aggravation of the condition during pregnancy.[5,6] Within a few weeks after the onset of pregnancy, these areas may change to rather sharply circumscribed, raised, variable in size, intradermal, reticular in pattern, conglomerate masses of dark bluish venules, which become tender, warm, and tense. The authors have desig-

nated these lesions as "angiectids." They may produce such pain as to impair seriously the ability of the patient to work during the first trimester of pregnancy. The hormonal nature of this condition is demonstrated by the fact that within 48 hours after delivery there is marked regression of the angiectids and almost complete disappearance within two to six weeks. Most of these patients retain venous vestiges which are associated with premenstrual enlargement and pain, as already described. It is possible to control the pain during pregnancy or premenstrually with estrogenic hormones, but this subject is still controversial and in the experimental stage.

Conclusions

1. THE INDUSTRIAL physician's understanding of the physiologic disturbances associated with the various types of venous disorders of the lower extremity is basic for individualization of treatment.

2. Stasis complications can be prevented by proper elastic compression. If elastic stockings are elected, they should be made to order according to the physician's prescription.

3. Most stasis complications can be treated while the patient continues at work. The indications and proper application of the modern type of Unna's paste boot should be mastered by all practicing industrial physicians.

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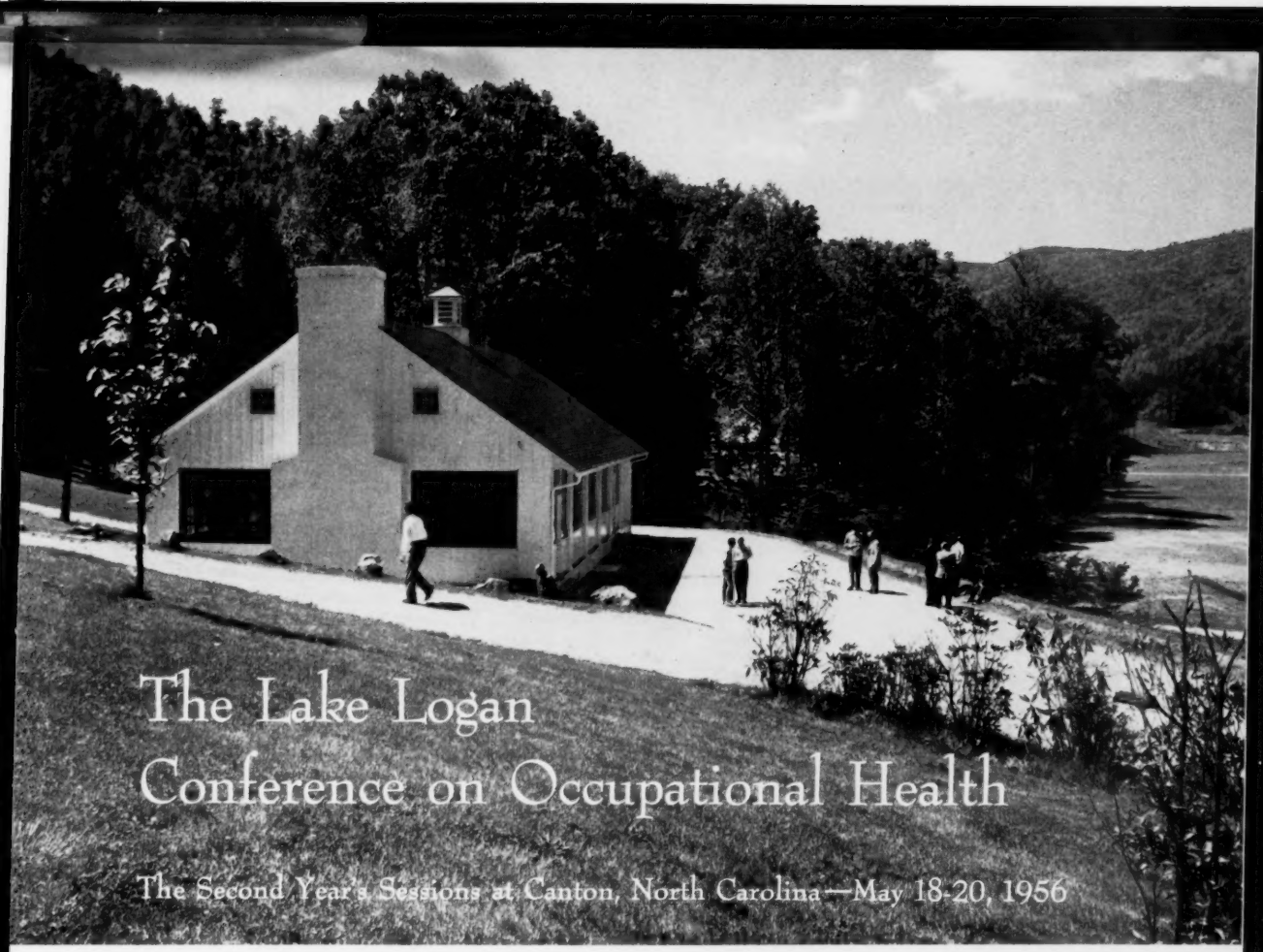
Diagnosis

OCCUPATIONAL medicine is environmental medicine concerned with all factors which influence the health, happiness, and productivity of a worker. The initial diagnostic approach to occupational ill-health is similar to that of internal medicine, but there are additional requirements. It is with these plus factors we are now concerned. Diagnosis means to distinguish, to identify, to arrive at a conclusion through critical perception. Today in general medicine there is an increasing tendency to assume without attempting to identify the cause of many diseases. This is largely due to the fact that the rise of therapeutic efficacy renders an exact diagnosis less material. The "miracle" drugs have devaluated diagnostic precision. The use of these drugs often effects a cure before the diagnostic search is initiated. In contrast, presumptive therapy or otherwise is of no avail in the treatment of an occupational disease if the exact etiology has been missed. Continued exposure to the toxic cause renders treatment futile. For instance, any treatment for the anemia of lead poisoning would not benefit the victim if he continues to be exposed. Diagnosis in occupational medicine also entails an economic responsibility not otherwise encountered. In those states where the law applies, and it should be an all-inclusive law in every state, one suffering an occupational disease is deserving of compensation. An erroneous diagnosis or biased opinion deprives or delays payment of compensation and the cost of medical care. Similarly erroneously attributing occupation as the cause of an entirely unrelated illness causes the employer to suffer an unjustifiable loss. Carried to conceivable limits of misconception of the purpose and philosophy of workmen's compensation, the first and one of the finest acts of social legislation in this country, could well be destroyed. Medicolegal controversy constitutes considerable cost to industry, to the worker, and to the consumer of goods. Much of it is needless, and much of the fault can be attributed to the medical profession's disinterest as well as its untutored opinion.

—From "Occupational Disease—Technique of Diagnosis," by RUTHERFORD T. JOHNSTONE, M.D., in *Rocky Mountain Med. J.*, May, 1956.



The Lake Logan Conference on Occupational Health

The Second Year's Sessions at Canton, North Carolina—May 18-20, 1956

INDUSTRIAL medicine, until recent years, was a comparatively simple form of medical activity. Now industrial medicine has become enormously complex. This complexity was one of the major items of consideration at the second Lake Logan Conference (May 18-20, 1956) where some 60 industrialists and industrial physicians in about equal numbers assembled for three days of joint appraisals.

Hosts of the group were Mr. Reuben B. Robertson, Sr., President of Champion Paper and Fibre Company, and Dr. Logan T. Robertson, Director of Occupational Health Services, with its headquarters in Asheville, North Carolina.

The physical setting for these scientific discussions was extraordinary, as was described in reporting upon the first Conference a year ago (*Indust Med. & Surg.*, July, 1955). Since the atmosphere in which this Conference took place was so contributive, some repetition is justified. In the mountains of North Carolina within its own forest areas, Champion Paper and Fibre Company maintains, chiefly for company purposes, a well appointed camp colony where simultaneously, should the need arise, several hundred visitors may be entertained under pleasurable circumstances. There exist ample facilities for recreation, food, transportation, and all other elements conducive to amiability and responsiveness. One building, the Pavillion, admirably lends itself to conference discussions. Under such surroundings this group went about the exploration of the present status, the needs, the accomplishments, and the shortcomings of occupational health as it exists today in the United States.

The group assembled represented about 4½ million industrial workers. While it does not necessarily follow that all of that large number of workers represented by their employers or Medical Directors are the beneficiaries of outstanding medical programs, the total number of workers surrounded by good industrial medical programs is estimated to lie somewhere near 10 millions which, no less, is an all too small percentage of the nation's total work force approximating 66 million men and women.

By design, all discussions were informal. In order to facilitate freedom of expression no record was attempted. And there was freedom. While there were no scheduled presentations, three areas of wanted appraisal were indicated. These are: "Labor-Management Relationship—Health and Medical Aspects," "Welfare and Insurance in Industry," and "Community Resources for Medical Care of the Employee." It did not come about that comment was limited to these major topics. With the exception of precise medical technical presentations, scarcely any item with regard to the workers' health needs escaped some consideration.

Housing was superb—four guests to the cottage.

The hosts, second from right, Reuben Robertson, Sr., and right, Dr. Logan T. Robertson.

THE OPENING of this comment mentions a newly acquired complexity in occupational health. That calls for substantiation, or at least exemplification. Such may be found in the much discussed plight of the industrial physician in relation to management-labor union negotiations. It was observed long ago that the health of workers was adjudged to be proper within labor negotiations. Even earlier, it was granted that the industrial physician should have no place at the negotiation table and certainly not as a partisan. Yet it was pointed out that final agreements leading to union contracts might involve the activities of the Medical Department to which the physician could not and should not subscribe and, in short, could not "deliver." Still the physician had been no party to the arrangements.

It was disturbing to many physicians at Lake Logan to discover that in the minds of some of the industrialists present, the belief that whatever was good with respect to the workers' health should be put in operation regardless of the restrictions that attend the activities of the industrial physician as part of the medical profession. The industrialists contended that if care of the worker's family as an aspect of industrial medicine was good for the industrial worker, then this should be brought about and without regard for the industrial physician's oft-stated position—that with rare exception (usually responsive to geographical situations) the care of workers' families belongs in the area of the practicing physician. The industrialists failed to perceive the enormous disruption that all such enterprises would bring about in intra-professional relationships. The attitude encountered was that if medical ethics interfered with the total good in connection with the workers' health, then something must be wrong with medical ethics. Still it did not appear that the most outspoken contenders had read or were familiar with "Guiding Principles of Occupational Medicine," which document constitutes the industrial physician's ethical guidance.

In general, there was a mild disposition to place the industrial physicians as a group on the defensive. Without obvious gentleness, the integrity of physicians more than once was questioned. Examples were cited as constituting culpable acts by physicians and hospitals. In one instance it was disclosed and overemphasized that a certain physician, in caring for a patient, obtained a blood count. A short time later, when the patient was hospitalized, a second blood count was procured and customary costs were entered. This was labeled as just one instance of the continual overcharging and duplication brought about in medical pursuits. There was little awareness that in certain conditions requiring close medical scrutiny, a series of blood counts at such short intervals as two or three hours might be requisite for the guidance of the careful physician in reaching a decision to operate or not to operate. A seeming consensus appeared to exist among nonmedical participants that the physician has lost some of his former high estate, and much of this centered about finances. It was pointed out by physicians that while the cost of hospital services has mounted two- and three-fold during the past 10 years—this being incontrovertibly related to labor costs, hospital operation and construction—the charges for services by physicians and surgeons during this same period of 10 years have increased only by 33%.

INDUSTRIAL physicians everywhere concede without debate that their public relations have been of low order. With forceful clarity it became apparent that if the cream of the industrial world as present at Lake Logan was lacking in the rudiments of understanding of medical procedures, activities and requirements, how low, indeed, must be the status of physicians within the

rank and file of industrialists and industrial workers. The most poignant conclusion that might have been reached by many physicians is centered about the shortcomings of public relations thus far achieved by the medical professions, including industrial physicians.

On many points there was no diversity of opinion. One in particular relates to the fact that, under some circumstances, a worker absent from his duties for injury or sickness, real or pretended, may gain more in money from the several forms of benefits provided than from his full salary at work. It was granted that there could be no greater incentive to absenteeism. Readily the conclusion came about that under no circumstances should sickness or injury be made profitable. While the opportunities for extra financial returns because of sickness and injury are few in number and scattered, it is not possible to condone even this scattered few.

The Lake Logan Conference recognized many paradoxes surrounding the industrial physicians. On one hand, and with emphasis, it was contended that the most successful industrial physician was that one who achieved a closeness and familiarity with every segment of industry's activities. He was called upon to establish rapport with every division of management, with workers as individuals and as members of their own organizations, and to acquire familiarity with industry's machines, products, processes, and materials. At the same time and contrawise, it was urged that the physician should keep aloof from any disposition to be a spokesman for either management or labor, to shun any participation in labor negotiations, and altogether to avoid any circumstances that would make it appear he might be committing either group in matters of significance.

FOR A LONG time, sympathetically, the medical profession has recognized that nursing is a "trapped" profession. Mightily nurses have striven to such a high degree of scientific competency that being trapped becomes of little consequence. In truth, there is scant disposition on the part of nursing organizations to reach any state of total autonomy through dissassociation with the medical profession. That would be undesirable; and that is known to all. Now comes the contention that industrial physicians equally are "trapped." This contention asserts that the trap has been created by the struggles between management and labor which have led to many doubtful medical activities associated with the name of "industrial medicine," "occupational medicine" or "occupational health." Many of the arrangements between management and labor as to health may be laudable but it is most undesirable that some be tucked in under the canopy of "industrial health."

In the cold atmosphere that often attends the relationships between the general medical profession and industrial physicians, the attitude of the general profession long has been that industrial medicine is just a little too close to socialized medicine to provoke professional comfort. Earlier that position thoroughly was unwarranted. Recent developments have made the position of the industrial physician within the total medical profession a little more vulnerable to justifiable attack. Industry the country over is just as much opposed to socialized medicine as is the medical profession. The prime reason for such opposition is the realization that a government that may socialize medicine by that same power may socialize industry as has been done in some other countries. It is preached that medicine is a likely first

Study in muscular coordination, but it wasn't all science.

In front of "Sit 'n Whittle"—after wetting the whistles.

Inside the Pavillion—the hard working conference group.

objective of socialization, prospectively to be followed step by step with socialization of other enterprises. This position of industry is well taken, but to forestall the initial step, i.e., socialized medicine, industry has proved willing to lend itself to a degree of industrial socialized medicine with most of the bills being paid by industry. Some good may exist in these innovations but the use of the term "industrial medicine" for many of them is deplorable.

The physician group at Lake Logan, declining to be put on the defensive, vigorously maintained that its foremost area of action was in the field of preventive medicine but then went too far in defining the scope of preventive medicine. It was emphasized that as to health, there are two kinds of workers—the "horizontal" worker, that is the sick worker flat on his back and otherwise, the "vertical" worker, the one going about his duties. The function of the industrial physician is to keep the worker vertical through prevention. Yet the contention was that almost all of medicine is preventive. Carried to the point of exaggeration, there might be insistence that the worker-patient who undergoes an operation for brain tumor has had his death averted, and that this prevention of death is preventive medicine. That is the sort of argument sure to lead to repercussions from the general medical profession which properly insists that somewhere down the line curative medicine becomes a fact and that in such matters unrelated to work origin, there should be no tampering in the name of preventive industrial medicine. Industrial medicine is not likely to enhance its status by tossing powdered semantics into the eyes of the medical profession in the name of preventive medicine.

THE outstanding quality of the discussions at the Conference will become apparent from the listing of the participants in attendance:

ANDERSON, A. S., Personnel Director, Champion Paper and Fibre Company, Hamilton, Ohio.

ARMSTRONG, DR. W. O., Medical Director, Continental Oil Company, Houston, Texas.

BARNES, JOHN M., Manager, Industrial and Community Relations, Champion Paper and Fibre Company, Canton, North Carolina.

BOSWORTH, DR. JOE M., Liberty Mutual Insurance Company, Atlanta, Georgia.

BRADBURY, J. G., Executive Vice-President, Southern Bell Telephone and Telegraph Company, Atlanta.

BRIDGES, CLARK, Secretary, Council on Industrial Health, American Medical Association, Chicago.

BRITTON, DR. JOHN B., Plant Physician, Champion Paper and Fibre Company, Canton, North Carolina.

BUNNELLE, ROBERT, Publisher, *The Asheville Citizen-Times*, Asheville, North Carolina.

BURR, HENRY B., Administrator, Medical Services, Westinghouse Electric Corporation, Pittsburgh.

CLIFFE, FRANK B., Vice-President, H. J. Heinz Company, Pittsburgh.

COLLINS, DR. RALPH, Psychiatrist, Eastman Kodak Company, Rochester, New York.

CRANE, FRANK, Commissioner of Labor, North Carolina Department of Labor, Raleigh.

DAVIS, DR. KIEFFER, Medical Director, Phillips Petroleum Company, Bartlesville, Oklahoma.

DU PONT, E. F., Director, Employee Relations Department, E. I. du Pont de Nemours and Company, Inc., Wilmington, Delaware.

DUFFY, DR. JOHN C., Medical Director, International Business Machines Corporation, Endicott, New York.

EVANS, DR. O. D., Consultant, Occupational Health Services, Asheville, North Carolina.

FORBES, T. M., Executive Vice-President, Cotton Manufacturers Association of Georgia, Atlanta, Georgia.

FORD, T. G., Director of General Industrial Relations, American Enka Corporation, Enka, North Carolina.

GILLEN, JAMES M., Director, Personnel Research, General Motors Corporation, Detroit.

GOLDSTEIN, DAVID H., Medical Director, *The New York Times*, New York.

HALL, DR. JOHN R., JR., Colonel, Medical Corps, Department of the Army, Office of the Surgeon General, Washington, D.C.

HART, JOHN, Director of Employee Relations, B. F. Goodrich Company, Akron, Ohio.

HIMLER, DR. LEONARD, Mercywood Hospital, Ann Arbor, Michigan.

HULSART, C. RAYMOND, Assistant Secretary, *The New York Times*, New York.

IRVIN, DR. EARLE A., Medical Director, Ford Motor Company, Dearborn, Michigan.

JOHNSON, HERBERT, Vice-President, General Services, Jones & Laughlin Steel Corporation, Pittsburgh.

JONES, DR. E. S., Jones Clinic, Hammond, Indiana.

KLUSS, CHARLES, Partner, Edwin Shields Hewitt & Associates, Libertyville, Illinois.

KOURY, A. M., Director of Industrial Relations, Champion Paper and Fibre Company, Pasadena, Texas.

LAUER, DR. D. J., Medical Director, Jones & Laughlin Steel Corporation, Pittsburgh.

LAWRENCE, DR. H. W., Medical Director, Procter & Gamble Company, Cincinnati.

LEVER, CHAUNCEY W., Director of Public Relations, Abney Mills-Erwin Mills, Anderson, South Carolina.

LEVINSON, DR. HARRY, Psychiatrist, Menninger Foundation, Topeka, Kansas.

MACDOUGALL, DR. A. D., Medical Director, Electric Boat Division, General Dynamics Corporation, Groton, Connecticut.

MCCAHAN, DR. J. F., Medical Director, Loss Prevention Department, Liberty Mutual Insurance Company, Boston.

MCCORD, DR. CAREY P., Consultant, Institute of Industrial Health, University of Michigan, Ann Arbor.

MCGEE, DR. LEMUEL C., Medical Director, Hercules Powder Company, Inc., Wilmington, Delaware.

MALLERY, DR. O. T., JR., Director, Institute of Industrial Health, University of Michigan, Ann Arbor.

MILLER, DR. SEWARD E., Chief, Division of Special Health Services, Department of Health, Education and Welfare, Public Health Service, Washington, D.C.

NEWMAN, LOUIS E., Marine Propulsion Study, Atomic Products Division, General Electric Company, Schenectady, New York.

O'CONNOR, DR. ROBERT, Medical Director, U.S. Steel Corporation, Pittsburgh.

POWELL, WALTER H., Director of Industrial Relations, International Resistance Company, Philadelphia.

PUTNAM, COL. ROBERT J., Administrator, Occupational Health Services, Asheville, North Carolina.

ROBERTSON, DR. LOGAN T., Director, Occupational Health Services, Asheville, North Carolina.

ROBERTSON, REUBEN B., SR., Chairman of the Board and President, Champion Paper and Fibre Company, Canton, North Carolina.

SAWYER, DR. WILLIAM A., Medical Consultant, International Association of Machinists, Rochester, New York.

SORKEY, DR. HERMAN A., Psychologist, Occupational Health Services, Asheville, North Carolina.

TUDOR, W. W., Director of Personnel, Sears, Roebuck and Company, Chicago.

TYROLER, DR. HERMAN A., Consultant, Occupational Health Services, Asheville, North Carolina.

WHITNEY, DR. L. H., Medical Director, American Telephone and Telegraph Company, New York.

WILSON, A. M., Assistant Vice-President, Liberty Mutual Insurance Company, Boston.

WILSON, DR. REX H., Medical Director, B. F. Goodrich Company, Akron, Ohio.

WOOLMAN, C. E., President and General Manager, Delta C & S Air Lines, Atlanta.

ALL THIS critical analysis implies acrimony, controversy and bickering. By no means was such the case. The Conference was characterized by total friendliness, harmony, and an earnest desire to provide the industrial worker with a full measure of continuing health. There was the realization that the public, in its present mood, is well determined to have health measures supplied without direct expenses to the individual or his family. The real problem becomes how to provide this with fairness to all.

For the industrial physicians present at the Conference, unfailingly the discussions were illuminating. The best opportunities for industrial medicine to see itself in full nakedness is not from meetings solely participated in by physicians but, instead, group meetings with management and with labor. This second Lake Logan Conference provided a superb opportunity for industrial physicians to see themselves through the eyes of management. For physicians, this was the great worth of this Lake Logan Conference.

The scientific sessions little interfered with this pursuit. Clark Bridges of American Medical Association and E. S. Jones, president of Industrial Medical Association.

The ardent piscatorialist with the flawless technique of the purist was Louis Newman of General Electric Company.

Industrial Medical Association

President's Page

TWO MEETINGS, of interest to the industrial physician were held during the past month—the American Medical Association meeting in Chicago, and the Lake Logan Conference on Occupational Health at Canton, North Carolina.

At the AMA meeting two resolutions with regard to industrial medicine *per se* were introduced—one pertained to periodic examinations in industry, and the other to Health Centers. Both were referred to committees for further study.

The Lake Logan Conference brought together 51 men from the higher echelons of industry, insurance companies, and industrial medicine. An equal number of men from each field was in attendance and all were the guests of Mr. Reuben Robertson, President of the Champion Paper and Fibre Company, and Dr. Logan Robertson, Director of the Occupational Health Services in Asheville, North Carolina.

Well-planned meetings were held in the morning, afternoon, and evening with free, frank, and open discussion. Medicine in industry from the industrialist's point of view was presented, and the doctors were given an opportunity to express their thoughts and make suggestions.

Some of the problems given particular attention were unnecessary absenteeism and its possible remedies; excessive convalescence time following illness or accident by obtaining unwarranted statements of disability from family doctors; and prolonged hospitalization following minor procedures. It was felt by both management and the doctors that pre-employment examinations are essential, and periodic examinations are strongly recommended, but on a voluntary basis. However, in those types of work where there is a definite hazard, periodic examinations are essential and should be as frequent as deemed advisable by the Medical Department. Close cooperation between management and the Medical Department is imperative.

A prize-winning film, produced by The Champion Paper and Fibre Company, was shown to illustrate the advantages that accrue to him who lives by the Golden Rule—to wit, excellent relations, not only between management and the Medical Department, but throughout an entire organization.

E. S Jones M.D

Association News

The Brieger Clinic

SELDOM in the past have the clinical sessions of the Industrial Medical Association's Annual Meeting included a clinic on occupational diseases. Ever there has been misapprehension that such a clinic would attract no audience and no participation. Any supposition of disinterest should have been dispelled by DR. HEINRICH BRIEGER'S Clinic on Occupational Diseases at Jefferson Medical College, Monday, April 23, 1956, during the Industrial Health Conference at Philadelphia.

Since details did not appear in the printed program, they are here included to indicate the wide range of coverage:

"Two Cases of Talc Pneumoconiosis"—PAUL S. FRIEDMAN, M.D., Philadelphia.

"A Typical Silicosis and A Typical Beryllosis"—A. J. ORENSTEIN, M.D., Johannesburg, Union of South Africa, and HEINRICH BRIEGER, M.D., Jefferson Medical College.

"A Review of the Lung Biopsies Performed at the Department for Diseases of the Chest, Jefferson Medical College Hospital"—PETER A. THEODOS, M.D., Jefferson Medical College.

"Lung Pathology in Carbon Tetrachloride Poisoning"—HEINRICH BRIEGER, M.D.

"A Case of Unusual but True Lindance Poisoning and a Case of False 'Chlordane Poisoning'"—HEINRICH BRIEGER, M.D.

"The Value of Electromyography in the Diagnosis and Prognosis of Toxic Neuritis"—FRANCIS J. BONNER, M.D., Jefferson Medical College.

"The Diagnostic Use of Edathamil Disodium Calcium"—FREDRIC RIEDERS, M.D., Jefferson Medical College.

"Successful Treatment with Edathamil Disodium Calcium in a Case of Manganese Poisoning"—RAFAEL PENALVER, M.D., Havana, Cuba.

"Effects of Edathamil Disodium Calcium on Metal Deposits other than Lead Deposits"—FREDRIC RIEDERS, M.D.

Two items on this program were notable. The first was by DR. RAFAEL PENALVER, who recorded the first successful treatment of manganese poisoning by Edathamil disodium calcium. The second was a presentation by DR. FRANCIS J. BONNER on electromyography in which it was disclosed that a wide variety of neuromuscular affections—heretofore appraised as to disability chiefly on the basis of subjective manifestations—now may be appraised objectively through the suitable application of electromyographic apparatus and procedures.

Since this was a near-overflow clinical session, it is to be hoped that yearly, for a long time to come, other clinical periods may be devoted to the consideration of newness in occupational diseases.

Section on Preventive Medicine

THE AMA SECTION on Preventive and Industrial Medicine and Public Health, assembling at the 105th Meeting of the AMA on Tuesday, June 12, started off at a joint meeting with the Section on Pediatrics.

At the business meeting, June 13, Rutherford T. Johnstone, M.D., Delegate from the Section, presented his Annual Report, part of which follows:

"On October 13, 1954, the American Public Health Association adopted a resolution regarding the status of the United States Public Health Service. A similar resolution was adopted on December 10, 1954, by the Association of State and Territorial Health Officers. These were passed on to your Delegate who in turn submitted them to the Section on Preventive and Industrial Medicine and Public Health for their consideration, and the Section unanimously voted approval on June 8, 1955. However, many weeks prior to the June convention the writer submitted this resolution to Dr. George Lull's office, of the American Medical Association, so early that it became resolution No. 1 before the House. The speaker of the House referred this to the Reference Committee on Legislation and Public Relations. After due deliberation this Reference Committee reported back to the House of Delegates as follows: 'Your Reference Committee was unable to visualize all the consequences that might flow from the enactment of a law making the Public Health Service a part of the Armed Forces, or from a law vesting officers of the Public Health Service with military status. It therefore recommends referral to the Board of Trustees for study.' Space does not permit the quoting of the entire resolution as introduced and therefore the various Whereas clauses will be omitted in this report but attention will be called to the resolved portion. '*Resolved*: That the American Medical Association recommend that legislation be enacted by the Congress designating the Public Health Service as a component branch of the Armed Forces of the United States on an equal status with the Army, Navy, and Air Force, thereby strengthening the ability of the Public Health Service to maintain its existing personnel and recruit additional personnel to meet its expanded responsibilities, and be it further . . . . *Resolved*: That the American Medical Association recommend this action through the proper executive and legislative channels of the Federal Government.' The Board of Trustees considered the resolution regarding the Public Health Service status as it is related to the various armed services and then referred the resolution to the Council on Medical Service. This Council in turn contacted Dr. Leonard A. Scheele, the Surgeon General, and found that according to his opinion the resolution went too far in regard to military status. Therefore, the Council on Medical Service recommended that the resolution be not approved. Subsequent to the presentation of resolution No. 1 before the House of Delegates, two identical bills were approved by the administration. These are H.R. 7600 and S. 2587. They were in keeping with the resolution No. 1 except that they qualified that portion of resolution No. 1 which seemingly intimated that the military status sought would in some way perpetuate the doctor draft for the Public Health Service Officers. Dr. Scheele appeared before the Board of Trustees and American Medical Association Council on National Defense to discuss these various bills. As a conclusion to all this the Committee on Legislation of the American Medical Association has recommended active support of S. 2587 and H.R. 7600. This recommendation has been adopted by the Board of Trustees. It is therefore believed that the proponents of resolution No. 1 have obtained what they desired."

Dr. Johnstone's report was followed by the election of Officers.

Brigadier General Edward J. Tracy, Dayton, Ohio, was elected Chairman—to serve from July 1, 1956, to June 30, 1957.

Dr. Bruce Underwood, Washington, D.C., was elected Vice-Chairman—to serve from July 1, 1956, to June 30, 1957.

Dr. Rutherford T. Johnstone, Los Angeles, was re-elected Delegate from the Section—to serve from January 1, 1957, to January 1, 1959.

Dr. Oscar A. Sander, Milwaukee, was re-elected Alternate Delegate from the Section—to serve from January 1, 1957, to January 1, 1959.

Dr. Paul A. Davis, Akron, Ohio, was re-elected Representative to the Scientific Exhibit—to serve from July 1, 1956, to June 30, 1957.

There was no election for Secretary, since the term of Dr. Frank Princi as Secretary does not expire until June 30, 1960.

After the election, the purpose and objectives of the Section were outlined briefly and members were encouraged to transmit views, opinions, or any matters of business that might occur to them during the year to the Secretary for handling in proper fashion. This includes suggestions for the scientific program and/or business that members of the Section would like to have introduced to the House of Delegates. Although the Section meets but once a year, the Executive Committee of the Section is empowered to act at any time on matters within its province.

After this, the following resolution was introduced:

"WHEREAS, It has long been recognized that the health of the employee is an economic as well as human relations concern of the employer; and

"WHEREAS, Preventive medicine is actively concerned in maintaining the economic productiveness of said employee; and

"WHEREAS, It has been recognized that periodic physical examinations will contribute to the health of the nation and aid in the early recognition of disease; therefore, be it

"RESOLVED, That periodic physical examinations provided by the employer are within the province of the said employer, and do thereby provide a basis for a private enterprise approach to the health maintenance needs of a broad base of American citizens."

This resolution was approved unanimously by the Section and was transmitted to the Delegates for presentation to the House of Delegates as a resolution from the Section.

Dr. Johnstone also reported that a recommended change in the name of the Section had been agreed upon, and that the Section would thereafter be known as "Section on Preventive Medicine."

Dr. Edward P. Luongo, Medical Director, General Petroleum Corporation, Los Angeles, and retiring Chairman of the Section, entitled his opening address "Health Habits and Heart Disease: A Challenge in Preventive Medicine." This address drew extensive interest. It was abstracted on page 1 of the *Chicago Tribune*, June 14, 1956. The following is taken from the *Tribune* account: "Dr. Luongo said that his study was based on 100 company employees with coronary disease and 200 persons without it, matched for age and occupation. Among the two groups, smoking was about equal, with 18% non-smokers in each group. The rest smoked from one to one-and-a-half packs of cigarets a day for 10 to 15 years before their heart attacks or becoming involved in the study. The percentage of those who used alcohol was about 18% in both groups. Among those surviving coronary attacks, 71% used alcohol moderately anywhere from one to 10 years since their heart trouble. Preliminary findings of the study, he said, indicate there is some relationship between heart disease and nutrition, weight, and activity. More than two-thirds of the coronaries were overweight on an average of 10 to 15 years prior to their attacks, while only a third of the non-coronaries were fat before the study started. Seventy percent of the coronary group had no regular exercise pattern. In contrast, only 30% of the non-diseased group had no exercise patterns. Percentage-wise, coronary disease was about the same among executives, professionals, and clerical and skilled workers who did moderate or sedentary work. But the incidence of the disease among unskilled laborers doing heavy work was lower. As technological advances free more men from 'certain distasteful labor,' Dr. Luongo said, they will have more time and more money for leisure."

Letters

From Malaya

TO THE EDITOR: I was delighted to have a copy of "The Guiding Principles and Procedures for Industrial Nurses." Industry in this part of the world is very much of the back-room type. Enforcement of any reasonable standard code of safety is difficult. In Singapore one or two big factories have been developed in the last few years and I must say the environmental hygiene of these is very good. Only a few employ nurses. Our problem is not so much industry but plantations where large numbers of people are collected together. Medical services for these may be excellent or may be rudimentary. On the smaller plantations, medical care is left in the hands of a dresser. Some similar book instructing dressers what to do in an emergency would be very valuable.

—T. A. LLOYD DAVIES, M.D.
Professor of Social Medicine,
and Public Health, University
of Malaya.

Books

Monumental Treatise

ENCYCLOPEDIA OF INSTRUMENTATION FOR INDUSTRIAL HYGIENE: University of Michigan, Institute of Industrial Health and School of Public Health. Technical Editors, C. D. YAFFE, D. H. BEYERS, and A. D. HOSEY. Price $30.00, pp. 1243 plus xvii, 9 x 12, with 1400 illustrations, charts, and diagrams. University of Michigan Publication Service, Ann Arbor, Michigan, 1956.

This monumental treatise on instrumentation and methods for measurement of stress on workers arising from the occupational environment is one of the finest working tools that has ever come to this review's attention.

It will prove invaluable in every library and laboratory concerned with the measurement of chemical, physical and biological stresses which may adversely influence health.

Its seven sections cover most available instruments for measuring air contaminants in occupied spaces; for use in laboratories; and for use in connection with air pollution and meterology, air velocity and

metering, sound and vibration, ionizing radiations, and ultraviolet, visible, and infrared energy. Each section contains a general review of instrumentation for the area under discussion, with a selected bibliography, written by competent authorities in that field. Then follows the unique presentation of a nearly complete roster of specific available instruments of United States manufacture pertinent to that section.

The presentation for each instrument includes, in a uniform format, a discussion of uses, operating principle, physical description (including an illustration), performance data, source of supply and approximate cost, complete operating calibration, maintenance and servicing instructions, and a bibliography.

The Editors state that every effort was made to present information of a high level of accuracy, but that, in the last analysis, complete verification of a manufacturer's claims for instrument performance must be made by the user.

This encyclopedia brings together in one place all the reader needs to know about the instrument which he uses or is likely to use within the scope of the volume. Every user of instrumentation, regardless of his field of interest, will find this volume useful. It will be of special value as a text or reference book for teaching the principles of instrumentation.

This large book is well constructed, with durable cover, unusually heavy and opaque paper, and clear, easy-to-read type. The many illustrations are, with rare exception, of excellent quality and of sufficient size and clarity to visualize fine detail. The index and table of contents are adequate, and a 36-page appendix of pertinent tables and charts is provided.

—WILLIAM G. FREDRICK.

Toxicological Contributions

BIOCHEMICAL RESEARCH DEPARTMENT. The Dow Chemical Company, Midland, Michigan. No charge.

Over some decades the world of occupational health has turned to the Industrial Hygiene Division of the Dow Chemical Company in Midland, Michigan, for guidance in the protection of workers and consumers against the unwanted action of new and old chemicals, and particularly the new ones. More than one standard widely accepted as semi-official has been based almost entirely upon investigative work in Midland, fully trusting the judgment of the toxicologists there.

Now the opportunities are better. Even more may be expected from the Dow group. This small brochure in obvious pride describes a new building with new facilities but, fortunately, with the same outstanding chief personnel. This beautifully illustrated publication well states the purposes of the laboratory's function in this language:

"Toxicological investigation provides a basis for evaluating the hazards associated with manufacturing, handling, and using chemicals. It plays a valuable part in research and development leading to new products and new uses for old products. These contributions from the Toxicological Laboratory enable the company to fulfill its moral and legal obligations to its employees, stockholders, customers, and to the public."

The old term "Industrial Hygiene" has given way to the larger one "Biochemical Research Department." Under any name, the Dow Chemical Company may be trusted to make continuing contributions toward betterment in the field of industrial toxicology.

No Disappointment

PULMONARY CARCINOMA: Edited by EDGAR MAYER, M.D., and HERBERT C. MAIER, M.D., New York University Press, New York, (J. B. Lippincott Company, Philadelphia), 1956, pp. 540, $15.00.

It was predictable that at about this time, a book on lung cancer would appear. The book is here. Its forthright quality inspires acceptance, but its contents are startling. One wishes that its truths were not truths. In 1900, the total number of recorded cases of lung cancer anywhere was about 312. In 1954, in the United States alone, the estimated number is 25,000.

While this book is total in its coverage, with emphasis on pathology and diagnosis, that portion written by Hammond and Machle concerned with etiologies from industry has most appeal for industrial physicians. It is concluded:

"There is good evidence that uranium and its products; chromates, nickel, and certain hydrocarbons are responsible for the production of lung cancer in a few instances involving those engaged in specific industrial operations. A number of other substances have been suspected as causing lung cancer in industrial workers (e.g., arsenic, asbestos, beryllium, and other agents capable of producing pneumoconiosis), but in our opinion the evidence for their causal role is insufficient.

"Large segments of the population are exposed in varying degrees to air pollutants. There is reason to suppose this is capable of causing lung cancer in man but at the present time epidemiologic evidence is insufficient to establish the fact.

"There is a high degree of association between cigarette smoking and the occurrence of lung cancer. We are of the opinion that cigarette smoking acts as one of the causative factors for the development of lung cancer."

This book was opened in expectancy and closed after profit.

Knowledge Is Protection

DOCTOR AND PATIENT AND THE LAW (3rd Edition): LOUIS J. REGAN. The C. V. Mosby Co., St. Louis, 1956, pp. 716, $12.50.

One of the hazards attending the professional life of a physician is centered about the possibility of damage suits, valid or ill-founded. Some such suits are filed against nurses or hospitals, but the majority are directed primarily against physicians. When monetary awards are assessed against the physicians the present-day level is higher than at any time in the past.

It is obvious that if the practicing physician is to escape legal liability and penalty, he must have some understanding of his legal obligations to the patient and some knowledge of statutes and court decisions which are related to the several aspects of medical practice. Thus he must know what is required of him in cases such as those involving adoption, abortion, commitment, artificial insemination, sterilization, workmen's compensation, narcotics, the requirement of reporting births, stillbirths, communicable diseases, deaths, etc.

In this revision the original plan has been retained. Each section consists of a brief discussion of the subject therein treated, thus permitting the reader to obtain with minimal expenditure, timewise, a general understanding of the particular topic. Added to each section are extracts of decided cases which serve (1) to illustrate some or all of the points made in the preceding discussion, and (2) to set forth some

of the varying or contrary decisions respecting particular points.

Consideration is given to all of the important legal problems inherent in or growing out of the relationship of physician and patient, of dentist and patient, of nurse and patient, and of hospital and patient. To accomplish this more fully, much of the earlier material has been rewritten and expanded and several new sections have been added, notably: "Public Health Law"; "Foeticide, Infanticide, Concealment of Birth or Death"; "The Grievance Committee and Malpractice"; "Routine Case Handling in Claims Prevention"; and "The Patient's Interest in Malpractice."

Few books that do not deserve a new edition are republished. This book, now in its third edition, well merits that status. One favoring circumstance is that the author is both physician and attorney. Knowing this, in reading the book it is impossible not to wonder which profession was uppermost. In one opinion the lawyer author dominated the physician author, but only mildly so.

It is fundamentally important that physician-patient relationships rest upon a basis of mutual confidence. The honest, competent, conscientious physician should have some assurance that as long as he is doing a competent job he is not going to be harassed by litigation, subjected to unpleasant notoriety, and forced to spend much of his time in court trying to keep from being penalized. The doctor is entitled to have patients in whom he may safely have confidence.

The lawyer may take days to look up an important problem on which he is called to give advice. The engineer takes time to figure stresses, strains, gradients. But the physician may be called in the dead of night, aroused from a sound sleep and confronted with an emergency in which immediate action must be taken and highly specialized knowledge applied. The doctor has to carry his knowledge at his finger tips; but the doctor is a fallible human being.

It must be recognized, too, that the public interest, the patient's interest, is seriously affected when it becomes necessary for the physician, while caring for his patient, to give thought to safeguarding himself against the possibility of an unjust malpractice claim. In certain communities where malpractice has become a particularly vicious and menacing problem, charity patients have suffered because of the understandable hesitancy on the physician's part to take a risk without any compensation. Moreover, unless some solution of the problem is found which will bring about a lowering of malpractice incidence, increased cost of medical care must be anticipated; the attending physician may be forced into the costly practice of having a consultant for each patient. Indeed, already in a few localities, physicians' fees have had to be increased to meet the pyramiding costs of professional liability insurance; and it has become necessary for some hospitals to add a specific daily charge to each bed in order to meet insurance costs.

Adherence to the highest possible moral and ethical standards, and the constant exhibition of the highest degree of skill and care, will not eliminate all false claims of malpractice. In respect to such fraudulent cases, professional men have a further responsibility. There will be few instances of injury resulting from the claims of misguided or malicious patients when practitioners understand fully how to govern and protect themselves under the law.

Histamine

HISTAMINE: G. E. W. WOLSTENHOLME and C. M. O'CONNOR (Editors for the Ciba Foundation). Little, Brown & Company, Boston, 1956, pp. 472, $9.00.

"Scratch a Turk and find a Tartar." That inelegant aphorism foolishly may be paraphrased to read: "Scratch a Turk or anyone else and find histamine." Although this book does not so say, many scientists hold that all inflammation, that ubiquitous manifestation of all too much pathology, solely is initiated by outpourings of histamine. That simple word "histamine" has more technical names than some erstwhile principality ruler had titles. The number includes: 4-Imidazoleëthylamine; 2-(4-imidazolyl) ethylamine; 5-imidazoleëthylamine; Beta-aminoethylimidazole; Beta-aminoethylglyoxaline; Ergamine; ergotidine. It is a little amazing but, withal, gratifying that from many countries of the world there should have assembled in London a coterie of distinguished scientists with no immediate concern beyond this single chemical "histamine." By the time the colloquium was over 44 papers had been presented and learnedly debated. In short good time, those papers found their way into this book, happily dedicated to Sir Henry Dale, O.M., G.B.E., M.D., F.R.C.P., F.R.S., of The Wellcome Trust, London.

Some billions of persons have lived and died in this world without any awareness of the histamine always in them and always about them. They fared little worse for this unawareness. Nowadays some thousands of physicians successfully practice medicine without being able to pronounce "Beta-amino ethylendiamine" or any other of histamine's aliases. Glibly they talk of "antihistamine" and apply them, little disturbed by the fact that histamine is far more important than all the antihistamines. Should there be the desire to probe deeper, then this book may be relied upon to dispel all that is lacking.

Science Miniature

Occupational Erythema

CAREY P. McCORD, M.D.

LATELY the lay press has attracted concern over a group of workers in Grand Rapids, Michigan, who, on moderate drinking of beer, developed a pronounced and mildly persistent abnormal blushing or flushing. Since beer drinking was with precedent, this pronounced blushing was suspected to be related to some undisclosed exposure at work, although suspicion also included unaccounted for exposure to nitrites and Antabuse, both of which induce unwanted blushing.

The Michigan Department of Health at Lansing, after investigation, furnished the facts as to the cause of this disturbance. These workers were exposed above tolerable limits to trichlorethylene, an industrial solvent. "Tri" exposure leads to a red-faced jag known to many as a "tri-jag." Sometimes so also does alcohol drinking, moderate or immoderate. Alcohol exaggerates the "tri-jag." The summative action of these two vasodilators was just too much for the skin's capillaries. Between giving up beer drinking at the bar and giving up "tri" at work, the latter lost. Protection against "tri" exposure at work has been installed. The Grand Rapids' mystery of the red-faced workers is over.

INDUSTRIAL MEDICINE AND SURGERY

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ESTABLISHED 1932

Publisher A. D. CLOUD

Volume 25 JULY, 1956 *Number 7*

Environmental Factors in Lung Cancer

THE UNITED STATES Public Health Service through its National Cancer Institute has completed a new statistical appraisal of all previous statistical analyses, including a 1955 investigation among 40,000 persons conducted by the U. S. Census Bureau, with regard to tobacco smoking causation of lung cancer. The major conclusion is that tobacco smoking is culpable. Between men and women smokers the ratio is five to one unfavorable to men. By 1965 the percentage in women will have increased significantly while the present unfavorable ratio (which is the highest sex disparity known) for men will have diminished. This does not imply that the total number for either men or women necessarily will have diminished.

So far these statements are of no greater significance to industrial physicians than to others. But, this same statistical arrangement provides another salient conclusion. When the habits of rural smokers and lung cancer frequently are examined alongside those of urban dwellers, the preponderance of city lung cancer provokes insistence that a multiplicity of environmental factors contribute to lung cancer causation.

This manifestation naturally affords a lot of comfort to the harassed tobacco industry which promptly takes public notice that tobacco has multiple environmental bedfellows with which to share the onus of exogenous causes of lung cancer. But scant comfort becomes the lot of industrial physicians. These environmental factors are little named and little known, but there is only minikin prospect that industry may escape all blame as a contributor. The purview of the industrial physician—always encompassing a mightiness—yet must be broadened to the better realization that his industrial world may be making more unwanted gifts to lung cancer occurrence than he now knows.

Then and Now

IN RECENT editorial comment in another medical periodical, note was made of the change in character of annual medical conferences. In essence it was stated that in days far past those in attendance were dedicated to the scientific assemblies, whereas now the dedication is to scientific exhibits and other audio-visual attractions.

A similar opportunity arises to present the changes in the medical situation in terms of titles of scientific publications at present and for times long past. For this purpose of contrast the titles of the leading articles of the current issue (June 15, 1956) of the *Journal of the American Medical Association* are presented. The shift is then to one number of the same *J.A.M.A.* (Volume I) published September 1, 1883.

Titles for 1956: "Importance of Biological Research in Industrial Medicine"; "A Physician Looks at Athletics"; "Deaths Following Electrotherapy"; "Neuropsychiatric Sequelae of Prematurity"; "Long-Term Follow-Up of Patients Who Received 10,098 Spinal Anesthetics"; "Palatine Petechiae, An Early Sign in Infectious Mononucleosis"; "Results of Mobilization of Fixed Stapedial Foot Plate in Otosclerotic Deafness"; "Control of Chronic Pain by DL-Alpha Acetylmethadol"; "Hydrozyzine (Atarax) Hydrochloride in Dermatological Therapy"; "Intravenously Given Urographic Mediums"; "Study of 500 Patients with Asymptomatic Microhematuria"; "Evaluation of the Serum Glutamic

Oxalacetic Aminopherase (Transaminase) Test"; "Use of Methallenestril (Vallestril) in Control of Menopausal Symptoms"

The leading editorial in this current issue is devoted to "Radioiodine for Hyperthyroidism."

Titles for 1883: "Remarks on Intra-Pelvic Inflammation in the Chronic Form"; "Fractures of the Long Bones"; "Exsection of Both Hip Joints for Morbus Coxarius"; "An Appliance Adapted to Occasional Gynaecic and Obstetric Emergencies"; "What Means Can be Judiciously Used to Shorten the Term and Lessen the Pains of Labor"; "Report of Two Cases of Catheters, Broken off in the Prostatic Portion of the Urethra, Removed by the Use of a New Instrument"; "The Use of the Trephine in Chronic Pleuritis."

THE LEADING editorial in this 1883 issue is entitled "Contract Practice and Ethics." This editorial at the outset cites a letter of inquiry relative to a salaried physician of a railroad company who desired affiliation with a local medical society. The editorial comment is salutary. A portion is quoted:

"Railroad companies and many other corporations have very important interests to serve and protect which require the aid of medical and surgical science and skill wholly independent of direct attendance on individual patients. And it is highly proper for them to employ a competent medical officer or superintendent to advise in regard to the sanitary condition of their cars, stations, workshops, etc., and to promptly attend whenever important accidents occur to see that proper arrangements are made for the care of the injured, to note the kind and extent of injuries, and if any injured are destitute of means for helping themselves to see that they are professionally provided for, and finally, to aid the company in settling, on a just and fair basis, all claims for damages. These are all duties that no one except a competent medical man can perform. And we see no reason why it is not as proper for a railroad or any other corporation to appoint a medical officer for these duties and pay him a salary, as it is to appoint and salary a superintendent of machinery. Such a medical officer, performing his duties in an intelligent and honourable manner, would not trespass upon any rule of ethics or interfere in any degree with the rights of his professional brethren in the practical performance of their duties, nor with the right of every patient to choose his own medical or surgical attendant. But he might be of great service as an intelligent adviser to all the other parties concerned."

Distinctly there is contrast and all for the good, as reflected in these compared titles. But the attitude of the American Medical Association toward industrial medicine and industrial physicians has not wavered. In a recent *J.A.M.A.* (April 21, 1956, page 1411) editorial language akin to that found in the 1883 issue appears and is quoted:

"The industrial physician, far from competing with the private practitioner, is a valuable source of referral, and through mutual cooperation a better solution of the health problems of the worker can be made. One of the chief functions of the industrial physician is to determine the employee's physical fitness for a proposed job. He must also apply the principles of environmental sanitation to his plant and advise management in all matters pertaining to the health of the workers."

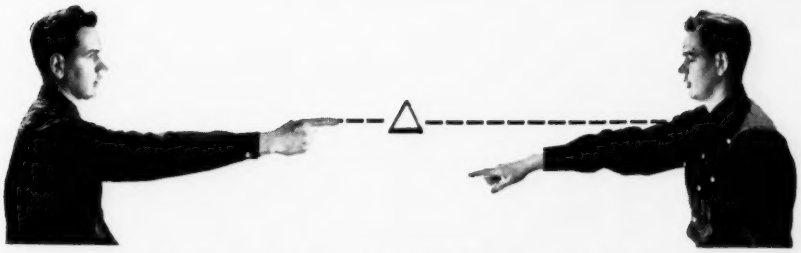
"A Servant When He Reigneth"

THE INDUSTRIAL nurses, through their official organization, A.A.I.N., are calling attention to the existence of a situation which they view with concern. To the Industrial Medical Association and the A.M.A. Council on Industrial Health they have addressed the following statement:

"We have recently learned that non-professional workers, such as first-aiders, are being hired in positions of authority over professional registered nurses. We believe you will agree that this is contrary to accepted standards of practice. . . . "

The nurses' protest is noted here in order that the existence of situations such as the ones in question may be given wide publicity. The more these irregular practices involving professional people are known and talked about, the sooner they will be recognized not only as evidencing extremely bad judgment, but also as containing a lot of legal and employee-relations dynamite. Public opinion—aided, sometimes, by stockholder opinion—can be a powerful antidote to management stupidity.

It is hoped that full knowledge of the facts of these deplorable instances may be forthcoming. Their publication would make interesting reading.



1. Bárány Pointing Test. *The patient points at a stationary object, first with his eyes open and then closed. A constant error in pointing (past pointing) with his eyes closed in the presence of vertigo indicates peripheral labyrinthine disease or an intracranial lesion.*

2. The Caloric (Bárány) Test. *The patient sits with his eyes fixed on a stationary object and the external ear canal is irrigated with hot (110 to 120 F.) or cold (68 F.) water. If the vestibular nerve or labyrinth is destroyed, nystagmus is not produced on testing the diseased side.*

3. The Rotation (swivel chair) Test. *The patient sits in a swivel chair with his eyes closed and his head on a level plane. The chair is turned through ten complete revolutions in twenty seconds. Stimulation of a normal labyrinth will cause nystagmus, past pointing of the arms and subjective vertigo.*

Notes on the Diagnosis and Management of "Dizziness"

I. Vertigo

The term "dizziness" (vertigo) should be restricted to the sensation of whirling or a sense of motion.[1] This sensation is usually of organic origin and is the tangible symptom of a specific pathology.

Moderate vertigo, with a sense of motion and a whirling sensation, may be produced by infection, trauma or allergy of the external or middle ear. Examination of the ear will usually disclose the abnormality.

Severe vertigo, which will not permit the patient to stand and causes nausea and vomiting, indicates an irritation or destruction of the labyrinth. The specific condition may be labyrinthine hydrops, an acute toxic infection, hemorrhage or venospasm of the labyrinth or a fracture of the labyrinth. Multiple sclerosis and pathology of the brain stem should be considered also.

It is important to learn if the patient's sensation is continuous or paroxysmal.[2] Paroxysmal vertigo suggests specific conditions: Ménière's syndrome, cardiac disease and epilepsy. Continuous vertigo without a pattern may be due to severe anemia, posterior fossa tumor or eye muscle imbalance.

Dramamine® has been found invaluable in many of these conditions. In mild or moderate vertigo it often allows the patient to remain ambulatory. A most satisfactory treatment regimen for severe "dizziness" is bedrest, mild sedation and the regular administration of Dramamine.

Dramamine is also a standard for the management of motion sickness, is useful for relief of nausea and vomiting of radiation sickness, eye surgery and fenestration procedures.

Dramamine (brand of dimenhydrinate) is supplied in tablets (50 mg.) and liquid (12.5 mg. in each 4 cc.). G. D. Searle & Co., Research in the Service of Medicine.

1. Swartout, R., III, and Gunther, K.: "Dizziness:" Vertigo and Syncope, GP *8*:35 (Nov.) 1953.

2. DeWeese, D. D.: Symposium: Medical Management of Dizziness: The Importance of Accurate Diagnosis, Tr. Am. Acad. Ophth. *58*:694 (Sept.-Oct.) 1954.

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News, Comment, Opinion

IN "Actions by Board of Trustees" in *J.A.M.A.*, (May 26, 1956, page 383) the following appears: "The Board approved cooperation by the Council on Industrial Health with the United States Department of Labor, which is attempting to prepare a Model Workmen's Compensation Act."

Oculists' Sessions

ASSOCIATION of Surgeons of the New York Central System will hold its Annual Meeting, October 3-6, 1956, at Hotel Statler, Boston. There are to be two Oculists' sessions, the first on October 3 at which the speakers will include Dr. Robert Trotter, and Dr. David Donaldson, Howe Laboratory; and Dr. Carl C. Johnson, Assistant Surgeon, Dr. Robert Brockhurst, Retina Service, and Dr. Taylor Smith, Pathology Laboratory, Massachusetts Eye and Ear Infirmary. The second session on Thursday, will include visits to the various departments and services of the Eye and Ear Infirmary and the Laboratory.

Keep Cool

KEEP OFFICE WORKERS cool if you want them to work efficiently, says Dr. Lucien A. Brouha, Chief of the Physiology Section, Haskell Laboratory, E. I. du Pont de Nemours and Company. In the April issue of *Office Executive*, published by National Office Management Association, Dr. Brouha says that workers tire more readily when temperatures are high. Among suggestions he makes are: (1) have an adequate ventilation system; (2) insulate sources of heat properly; (3) protect workers with screens or special clothing if necessary; (4) develop methods and equipment so that workers can be located as far as possible from sources of heat such as radiators. Provide air conditioning if possible; (5) keep readily available an adequate supply of drinking water. Reason for the fatigue when temperatures are up, according to Dr. Brouha, is the increased heart action at higher temperatures for the same amount of work. High humidity also reduces efficiency. It is the nature of the work rather than the amount that produces fatigue.

—*Personnel Journal*, June, 1956.

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Associate Medical Director: (d) Masters, (public health); Board qualified, Preventive Medicine, seeks connection with emphasis on preventive medicine; currently, staff phy., industrial medicine dept, large clinic.

Assistant Medical Director: (e) Masters, (industrial medicine); years' fellowship, (industrial medicine), A.E.C; seeks indus medicine with or without atomic instalation.

Staff Physician or Ass't Med Dir: (f) 12 yrs. Ass't Medical Director, Assistant Director, and, now, Administrative Director, Liberal Arts College; present position offers little opportunity for further development; experienced, both clinically and administratively; seeks industrial medicine, any locality but prefers Pennsylvania or East; middle 40's.

Staff Physician: (g) Seeks industrial medicine with regular hours as career; past 5 years, busy private general practice; any locality but prefers Virginia or East.

Staff Physician: (h) 3 years, private general surgical & medical practice; 2 years, medical officer; seeks industrial medicine as career; consider any large city but prefers New Jersey, New York State; age, 31.

Staff Physician: (i) 29; married; completing training in internal medicine; prefers indus medicine in California, Texas, Ohio.

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Chiefs: (l) Newly created posts; Full charge, new regional plants of one of America's largest companies; excellent salary & perquisites equal to $16,000; Westcoast; South; Central; East.

Chiefs: (m) Good sized plants of major company; Indiana, Wisconsin, Ohio; excellent medical facilities, well-staffed and equipped.

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They Just Work

AMERICAN doctors should take a more active role in politics, says Rep. Walter Judd (R., Minn.), himself a physician. Many physicians work such long hours and pay such close attention to their patients, he says, that they sometimes fail "to take the longer view. . . . They won't get into politics; they won't discuss issues with their patients; they won't even bother to vote; they just go ahead and work. They're good in their profession. But what makes them good specialists sometimes makes them poor citizens." The Congressman's opinions of his former colleagues appear in the June issue of *Medical Economics*. He finds evidence for his views in the small amount of mail he receives from physicians on nonmedical issues. "Doctors seem to concentrate on their own interests more than most groups," he comments. "I don't say this critically; it occurs as a result of their specialization. But we get less mail from doctors on general issues—international policies, farm policies, education, etc.—than from practically any other group in our population."

Highly Individualized

WORKER productivity is not linked to age, according to preliminary Labor Department studies reported by Under Secretary of Labor Arthur Larson to Federal-State Conference on Aging in Washington last week. Debunking idea that older workers are inferior in productivity and performance, Mr. Larson said that studies indicate "productivity is a highly individual thing, even within age groups, and that output per man hour varies erratically between groups and within groups."

—*Industrial Relations News*, June 16, 1956.

Returned to Work

OVER 2,500 seriously injured industrial workers, many with amputated limbs or with paralysis from spinal cord accidents, have been returned to profitable jobs after rehabilitation at Liberty Mutual Insurance Company's rehabilitation centers in Boston and in Chicago. So states Stanwood L. Hanson, Liberty Mutual executive, in the annual report on the centers' operations. Of 2,866 cases that have undergone rehabilitation in Boston from 1943, when the pioneer Boston center was established, through the end of 1954, 85%, or 2,442, have been definitely improved by the treatment. Of these, an impressive 82.3%, or 2,010, have actually returned to work. At Liberty Mutual's smaller Chicago rehabilitation center, founded in 1951, of the 730 cases that have undergone rehabilitation, 659 were definitely improved by treatment, and of these 540, or 81.9% have actually returned to work. In terms of one of the most severe types of disability, paraplegia, which generally resulted in death up until 15 years ago, Liberty Mutual has undertaken rehabilitation on 85 paraplegia cases and completed work on 66. Of these, 48 have returned to work. Without rehabilitation, the anticipated cost of the 66 completed cases would have come to about $6,812,509. As the result of rehabilitation, the cost of these cases was reduced to $3,683,025, a gross saving of $3,129,484. The cost of providing rehabilitation was $676,771, which meant a net saving through rehabilitation of $2,452,713.

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Of the 2,866 cases rehabilitated in Boston some 449 were women. Average age of male patients was 44.4 years and of women 43 years. Of the total of 251 cases complete and closed out during 1954, 232 were improved to the point where they could work again. The average treatment period of all cases including examinations totalled 41.5 days. The average length of time from injury or initial surgery to time of admission to the rehabilitation center was 6.9 months. Comparable figures for the smaller Chicago center were nearly identical except for the average treatment period, which was 28.2 days, reflecting the fact that this center does not handle the paraplegia cases and in general does not handle as many of the severer injury cases as Boston does. All patients remained at the centers five days a week, for a full daily program. Lunches are provided for all patients, and room and board at nearby hotels or rooming houses for out of town patients. The average cost per case during the last fiscal years was approximately $594.

The dollar savings in compensation benefits alone are substantial, without going into the inestimable economic value of restoring a productive worker to industry, a taxpayer to the country, and a breadwinner to the family. Thus, a survey of typical injury cases among the patients at the Boston center indicated an average estimated saving in compensation benefits alone of slightly more than $1,000 based upon effective reduction of actual lost time from work or lessening of the permanent loss of function of the injured part. Liberty Mutual, in cooperation with the Massachusetts Memorial Hospitals and the Boston University School of Medicine, has established an industrial rehabilitation department and neurosurgical service for the treatment of paraplegia cases at Haynes Memorial Hospital, Boston. To house the new facility, Liberty Mutual has rebuilt and re-equipped the east wing of the hospital to handle 26 paraplegia patients and to provide an operating room for neurosurgery and a lecture amphitheater for instructing medical students in this new and specialized field.

"A Third of a Day"

How the worker can maintain good health is outlined in new booklet prepared by The Equitable Life Assurance Society as part of its "Assurance of a Fuller Life Series." Entitled "A Third of the Day," it develops relationship between on-the-job hours and time spent at rest and play. Distributed only by Equitable's Medical Department, 393 Seventh Avenue, New York 1, copies are available to business organizations from local agency managers, upon request.

—*Industrial Relations News*, June 9, 1956.

Catastrophic Health Insurance

The administration is about ready to present to Congress its program for major medical cost insurance for the 2,000,000 U.S. civilian employees and their 2,500,000 dependents. All U.S. employees and dependents who are participating in the two-year-old Federal group life insurance pro-

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gram would receive this catastrophic health insurance protection at no cost to themselves. The entire cost—about $32.5 million annually—would be paid by the United States. To varying degrees, hospital, surgical and medical care costs would be covered. The major medical care benefits, however, would not apply until $500 of hospital costs were paid annually by the employee. After that the United States policy would meet 75% of the cost. The employee would be reimbursed for 75% of all surgical costs after he had paid the first $250. He would be expected annually to stand the first $100 and would be reimbursed for 75% of the remainder. The assumption is that in most cases the employee would protect himself against these initial payments by purchase of basic health insurance.

—*Minnesota Med.*, May, 1956.

The More the Better

TO THE Mayo Clinic in Rochester, Minnesota, more than 125 corporations will send their executives this year for examinations. Only 26 were following this practice 10 years ago. To the Greenbrier Clinic in White Sulphur Springs, West Virginia, at least another 65 corporations will send their key men. Some companies maintain their own staffs of physicians to administer their executive health plans. Examinations are encouraged as frequently as twice a year, with the companies in most instances absorbing all the costs. I can think of happier spurs to a movement of this sort than the illness of our President. But the more the practice spreads up, down and across the lines of American industry, the better

—From "Industry Becoming Health-Conscious," by SYLVIA PORTER, in *Chicago Daily News*, June 18, 1956.

Cutting Accident Costs

THE MOST extensive study of accident problems to date is part of the medical research program at the Third Avenue Transit System, New York City, a bus company whose accident prevention program has reduced "preventable" accidents by more than 50% since 1947. Cost of the program is small in comparison to savings, according to Dr. Harold Brandaleone, the company's Medical Director. The time and effort involved in excluding unqualified candidates (from 35 to 40% of those who apply) pay off, when the $300-$500-a-man cost of training is considered. Substantial savings have been effected also through decreased absenteeism, sick pay, and compensation costs, without even considering unknown sums saved through accident reduction. The program operates on the theory that predetermination of "safety proneness" is possible if data about each individual and all factors operating in the work situation are competently evaluated. Identification of the accident repeater is not simple. Factors in accident susceptibility differ from person to person. A rigid method of pre-employment examination, similar to that used by the U.S. Air Force in evaluating pilot candidates, has been established. The steps are:

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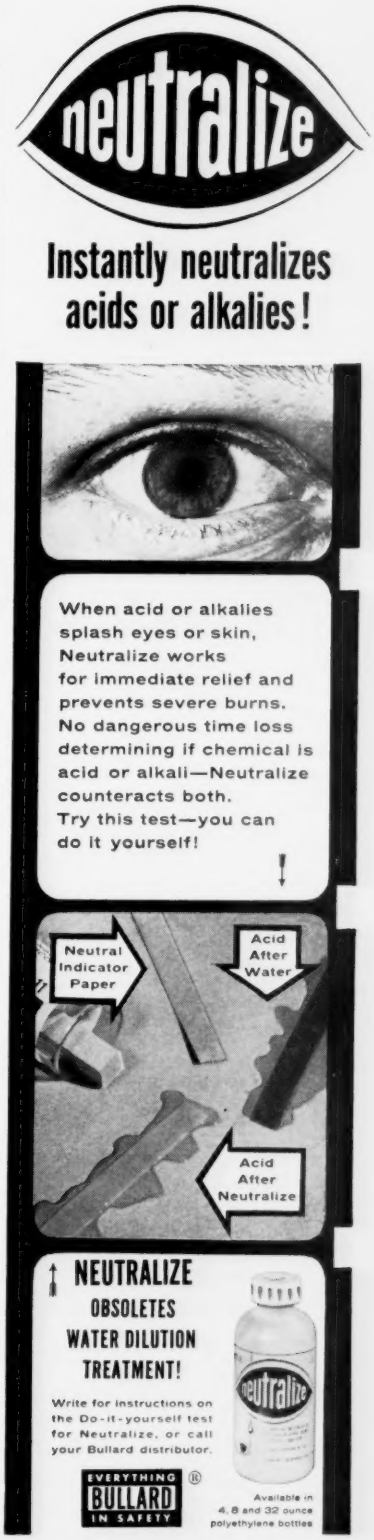
(1) the usual complete investigation of the applicant, with special attention to previous employment and army records; (2) a series of psychophysical tests: performance, Keystone telebinocular, depth perception, glare resistance, lateral vision and hearing; (3) written psychological tests, including the Thurstone temperament schedule, the Maslow security-insecurity tests, and the standard examination for transit employees, which measures aptitudes and other personality characteristics relating primarily to stability and maturity; also an interview with the psychologist, and an evaluation based on test results plus the other information plus the interview; (4) in the Medical Department, a medical history filled out by the applicant and discussed with him by the examining physician; an examination to determine emotional stability; and a physical examination, including urinalysis, blood tests and chest x-ray; (5) study of the reports by medical and safety directors, in order to reach a final decision. The medical service program also provides employees with clinical facilities for diagnosis and treatment of illnesses. A staff physician is sent to the home of any employee absent for five days. If he wishes, the physician will prescribe for him. If he has a private physician, a report is requested. Regular examinations determine physical changes which might result in accidents, and permit early detection of correctible defects. A man involved in a serious accident is referred to the medical department for careful study and to the safety department for retraining.

—*Industrial Relations News*, quoted in *The Management Review*, December, 1955.

Eye Protection

ALL PRODUCTION employees of American Brake Shoe Company are required to wear eye protection on the job. The safety glasses or goggles are supplied without charge to each employee or visitor to its plants. If an employee's goggles are struck by a foreign object in the course of his work, and his eyesight is thereby saved, he is enrolled in a nationwide organization known as the Wise Owl Club, sponsored by the National Society for the Prevention of Blindness. Since Brake Shoe joined the Wise Owl group, the eyes of more than 100 Brake Shoe employees have been saved by wearing eye protection.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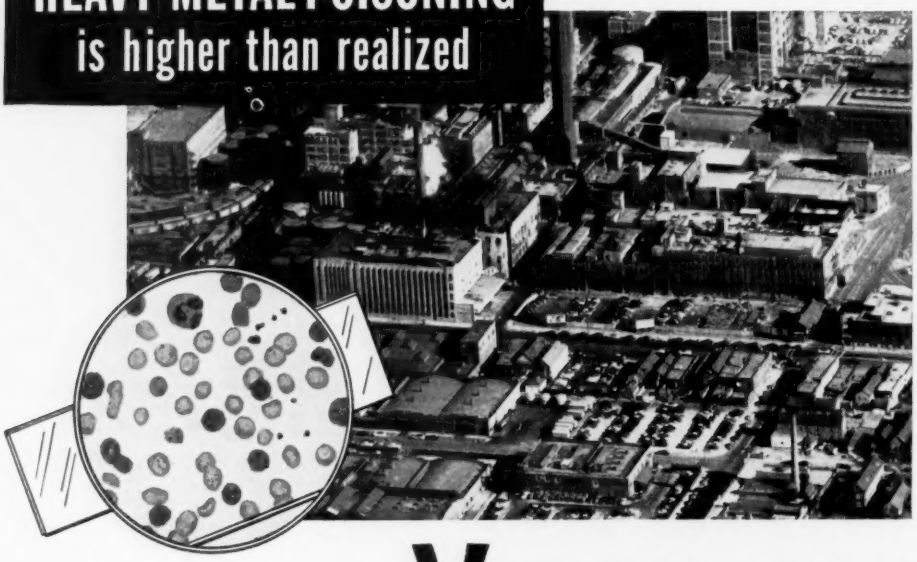

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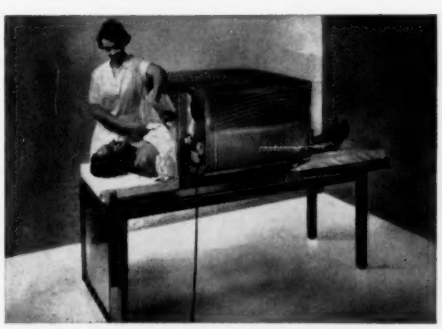

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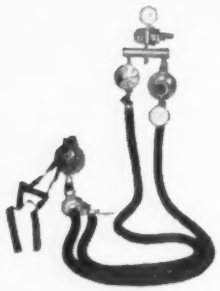

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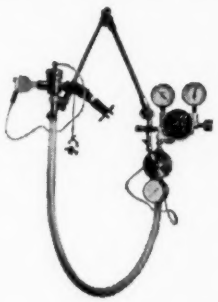

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Summer Therapy in PSORIASIS

The eruptions of psoriasis may disappear in the summer, to reappear in the winter (Madden[1]). According to Morris[2], "the best security against relase is the completest possible removal of all remnants of the disease."

To avoid recurrence in the fall, psoriasis should be treated intensively with RIASOL all summer. Treatment should be continued until every patch, papule, scale and "bleeding point" has been eradicated.

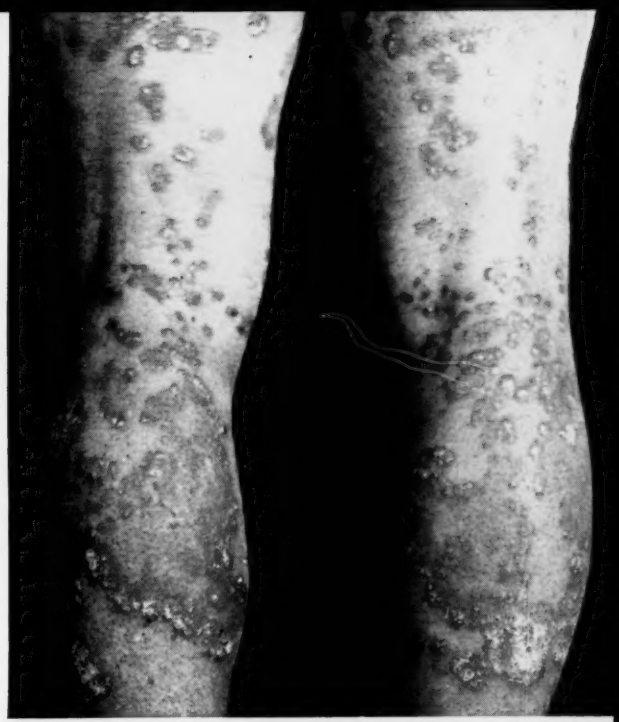
Permanent results with RIASOL may be secured when it is used conscientiously during the declining phase of psoriasis. Many physicians have reported freedom from relapses lasting years after a course of RIASOL treatment.

RIASOL contains 0.45% mercury chemically combined with soaps, 0.5% phenol and 0.75% cresol in a washable, non-staining, odorless vehicle.

Apply daily after a mild soap bath and thorough drying. A thin, invisible, economical film suffices. No bandages required. After one week, adjust to patient's progress.

RIASOL is supplied in 4 and 8 fld. oz bottles at pharmacies or direct.

1. *Minnesota Med.* 22:381, 1939.
2. *Brit. M. J.* 2:1328, 1954.



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"THE AMOUNT OF LOST TIME ...WAS GREATLY REDUCED"

*— reports this industrial physician**

In his recent on-the-job study of pain relief in industrial practice, Murray* observed that:

1. Phenaphen is more effective than a standard aspirin-phenacetin-caffeine formula for relief of moderate to severe pain . . .

2. Phenaphen is free from side effects despite its greater analgesic action . . .

3. Phenaphen is safe for machine operators since it is free from soporific effects, and thus permits returning to work or driving home with complete safety . . .

4. The superiority of Phenaphen is shown by the fact that "the amount of lost time . . . was greatly reduced."*

Formula: Each capsule contains:

Acetylsalicylic acid (2½ gr.)	162 mg.
Phenacetin (3 gr.)	194 mg.
Phenobarbital (¼ gr.)	16.2 mg.
Hyoscyamine sulfate (1/2000 gr.)	0.031 mg.

Dosage: One or two capsules as required. In industrial practice, Murray noted that "because of the complete absence of side effects, it is justifiable to increase the medication to two tablets every four hours."*

Supply: Bottles of 100 and 500 capsules.

*Dr. R. J. Murray, Medical Dept., Sperry Gyroscope Co., in an article published in the New York State Journal of Medicine, August 15, 1953 (Vol. 53, No. 16).

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Robins

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*—"satisfactory for everyday industrial use"**

For more severe pain, Phenaphen is also available with varying dosages of codeine added to the basic formula, providing greater analgesia, free from the habituation hazards of addicting narcotics, as:

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... Give salicylates in full dosage.

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REFERENCES:

1. J.A.M.A. 159:645 (Oct. 15) 1955.
2. J.A.M.A. 158:386 (June 4) 1955.

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